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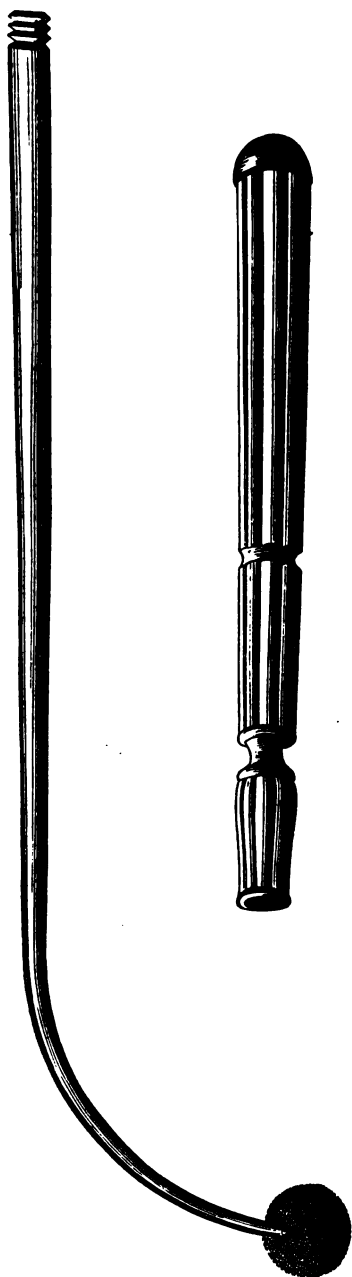
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Observations on the pathology of group :





For description of Plate see page 98.

OBSERVATIONS
ON THE
PATHOLOGY OF CROUP:
WITH
REMARKS ON ITS TREATMENT
BY
TOPICAL MEDICATIONS.

By HORACE GREEN, M.D., LL.D.,
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THE AMERICAN MEDICAL ASSOCIATION, ETC.

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PREFACE TO FIRST EDITION.



WHEN, about eighteen months ago, the author brought before the medical public, in a work on Diseases of the Air-Passages, the subject of the treatment of disease of the larynx and trachea, in the adult, by means of the direct application of therapeutical agents to the lining membrane of those cavities, the proposition was received with distrust by a large proportion of the profession; whilst another part publicly and peremptorily declared that it is practically impossible to convey medicinal agents, in the manner proposed, below the epiglottis.

Less than two years have passed, and that practice which, as the British and Foreign Medical Review has remarked, was received by "some of the author's countrymen with a sneering incredulity," and was by them declared to be an "unwarrantable innovation," an "anatomical impossibility," as well as "physiologically impracticable," has been adopted, not only by distinguished medical men in almost every part of this country, but by the highest medical authority of Europe; and by the latter has been commended as a method of treatment which is not only the most effectual and certain in some forms of pulmonary disease, but as one that "will lead to important changes in the prophylaxis and cure of pulmonary phthisis."

Less reluctantly, therefore, does the author now advocate—as he has done in the following pages—the practice of making topical application of medicinal agents into the larynges of young children, for the treatment of membranous croup. Nor does he hesitate to declare, although the proposition may be received by many with allowance, that it is a plan entirely practicable, safe, and, when judiciously employed, in the highest degree efficacious.

The first successful attempt to introduce a solution of the nitrate of silver into the larynx of a child affected with croup, was made by the author, in November, 1842. During a period of nearly four years, previous to this time, he had been constantly employing this remedy, locally, in chronic, laryngeal and bronchial diseases of adults. But, up to the above period, such were the prejudices against its employment, and such the skepticism of a large proportion of the profession on the subject of topical applications to the larynx, in the cases of adults even, that, hitherto, he had not ventured on its use in the treatment of diseases in young children; although the happy effects which in so many instances had followed the application of a strong solution of the nitrate to the diseased pharyngo-tracheal membrane and its follicles, had long before convinced him that the same remedy must prove highly efficacious in a disease so strictly local, and of a nature so peculiar, as is that of Croup.

The history of one of the earliest cases of Croup which came under his observation, and was treated by topical applications to the larynx, was given at a meeting of the New York Medical and Surgical Society, November 1st, 1845, and the members present were

desired to make trial of the local remedy, whenever an opportunity for employing it in Croup might occur. Several cases were thus treated subsequently, and with success, by other medical men in this city; a notice of some of these will be found in the subsequent pages.

In describing, in this work, the application of the nitrate of silver to the mucous membrane, the term *cauterization* is frequently employed. It is not strictly correct; for, a solution of the crystals of nitrate of silver, of the strength of from two to four scruples of the salt to an ounce of distilled water, when applied freely to the mucous membrane, does not act, as has been supposed, by burning, or as a cautery; it effects no destruction whatever of the textural matter, but forms, immediately, a union with the albumen, and other secretions of the mucous lining; whilst it operates at the same time to produce a most favorable change in the vital action of the parts.

In conclusion, this little work, and the practice herein advocated, are commended to the candor of that portion of the profession who have the liberality to admit that improvements in the practice of our art can be made; and the energy and honesty to test such proposed improvements before condemning them.

12 CLINTON PLACE.

New York, Sept. 1848.

PREFACE TO SECOND EDITION.



“It is my firm belief,” said Sydenham to Dr. Harris, the author of an essay on the Acute Diseases of Children, “that your little book will be more useful to mankind than all I have written.” “The book did not in itself, perhaps, merit so high a commendation,” said Dr. Cheyne, in alluding to this remark, “but Sydenham foresaw that it would turn the attention of physicians to a part of their profession the most useful, and the most neglected.”

In the publication of the first edition of this Essay, it was the sincere desire of the author to awaken in the profession an increased interest in that most frequent, and frequently fatal, disease of children, membranous Croup; and if any merit appertains to the work, it arises from this fact more, perhaps, than from all others, that its publication has served to call the attention of physicians to a method of treatment which, in their hands, as the author has reason to believe, has already been the means of saving the lives of many children.

The present edition has been carefully revised, and has received many important additions; which additions consist principally of observations made by ex-

perienced practitioners in this and other countries, on the treatment of Croup by topical medication. This method of treatment is employed, at the present day, more extensively in Europe even, than in our own country. The subject of direct medication of the larynx, in the treatment of Croup, was first brought before the profession of France in 1857, in a paper presented to the Imperial Academy of Medicine, by M. Loiseau, and which was entitled, "*A simple and easy method of entering the air-passages, in order to cauterize them, or to extract false membranes; to dilate the glottis; to introduce substances used in the treatment of Croup, either in the form of liquid or powder, and finally to take the place of tracheotomy.*"

A most interesting discussion on the subject of cauterization of the larynx and bronchi followed the reading of this paper, in which MM. Velpeau, Trousseau, Piorry, Loiseau, De Paul, and others, participated; and a commission was appointed to investigate the subject, of which M. Trousseau was made chairman. At a subsequent meeting, a very favorable report on the treatment of laryngeal diseases by this method was adopted, the commission declaring that cauterization of the air-passages, in the treatment of Croup and kindred affections, is not only practicable, but is of great utility; and M. Velpeau declared, in the discussion, that to M. Loiseau "belonged the merit of having called attention to this subject." "Thanks to his memoir," he continued, "we know Croup can be cured without operating for tracheotomy. That is a great deal. . . . I believe the method recommended by M. Loiseau is a good one. While diphtheritis is at the opening of the air-passages it is curable, and M.

Loiseau has ascertained that it is not difficult to carry medications into the larynx.”*

In alluding to this discussion of the Academy, the learned editor of the *Gazette Médicale de Paris* says of laryngeal cauterization: “As a therapeutical means, it merits a more serious attention. What is the relation of cauterization to Croup? It is a powerful, energetic means, *the only one which up to this time has really succeeded*. When the disease is limited to the upper part of the air-passages we cauterize, and all practitioners agree that this means is truly of great benefit. What is laryngeal cauterization other than carrying beyond the limits of ordinary cauterization a remedy recognized as good, efficacious, not only against the essence of the disease itself, but also against the pathological secretion? Laryngeal cauterization is, then, in this respect, much superior to tracheotomy. Experience seems to have already confirmed these theoretical hopes—future experience will say much more of it.”†

In the *Gazette Hebdomadaire* for August 27, 1857, the editor, after calling attention to what has been done in America in the treatment of Croup by cauterization, adds: “These experiments should be repeated by us, with that attention which the authority and the honorable position of our American *confrères* command. M. Loiseau, anticipated, as it is seen, in every particular, gives us, however, a useful example, and his merit will still be great if he succeeds in introducing into use a practice worthy of more attention than it has yet received.”

Not only in France are cauterizations extensively

* Union Médicale, August 27, 1857.

† Gazette Médicale de Paris, August 29, 1857.

employed, at the present day, in the treatment of membranous Croup, but, during the last year in particular, Topical Medication has been much relied upon in Great Britain, in the management of all forms of diphtheritic inflammation. Many of these important additional observations, on the advantage of local remedies in the treatment of Croup, to which reference has been made, will be found recorded in the present edition of this work.

HORACE GREEN.

12 CLINTON PLACE.

New York, June, 1859.

OBSERVATIONS
ON THE
PATHOLOGY OF CROUP.

CHAPTER I.

Nature and Pathology of Croup.

THE distressing nature of *croup*—its frequent fatality, and the interesting class of patients who, ordinarily, are the subjects of its attack, invest with a peculiar interest any plan of treatment which promises to mitigate its horrors, or in any degree to lessen its fatality.

Notwithstanding that the energies of some of the most distinguished medical men of the present century have been given to an investigation of the nature and the treatment of this disease, yet it is admitted at the present day by the best authorities, to be not only progressively on the increase, but so far uncontrolled by the ordinary remedial measures, as to prove fatal in

nearly one-half of the whole number of those who are attacked by the disease ! *

With emphasis, then, may it be said, that no member of our profession has discharged his duty, until he has at least made earnest efforts to add something to our stock of knowledge, respecting the pathology or the treatment of this formidable malady.

Not until after the middle of the last century, was croup recognized and described as a distinct disease. Until that period it was confounded with catarrh, and other diseases of the respiratory apparatus ; but in 1765, Dr. Home of Edinburgh drew up and published an Inquiry into its nature and treatment, and gave to the disease the name of *Croup* ;—an appellation by which it is universally designated at the present day.

The celebrated general order issued by Napoleon, in 1807, from the head-quarters of Finckenstin,—“ d’ouvrir un concours sur la maladie connue sous le nom de croup,” with the offered prize, awoke a new interest on this subject in Europe, and was the means of calling forth, from the savans of the continent, many elaborate and able essays on the disease, in which, says Dr. Cheyne, nothing was omitted in illustration of

* *Traité du Croup*, par M. Double, p. 479.

that disorder which industry could collect, or method arrange. These learned inquiries of the aspirants for the prize at concours, have been followed, during the last forty years, by numerous and valued essays on the pathology and treatment of croup, contributed by some of the most distinguished medical men of both Europe and America: and yet the views respecting its essential nature, and the opinions regarding the most certain and efficacious mode of its treatment, are not uniform, or well settled with the profession.

Diverse, moreover, are the opinions of the different writers on croup, with regard to the unity or the division of the disease into distinct varieties; some, on the one hand, making several species of the affection, according to the views entertained of its nature; others, again, considering the disease to be essentially one and the same in all cases, and as being modified only by external circumstances, or by difference of constitution in the subjects attacked.

These varied opinions of different pathologists on this and other affections, serve to embarrass the inexperienced, and to hinder our progress in the knowledge of disease.

Without attempting to settle any of the questions involved in these different opinions, I shall proceed to state that, after having given much

attention to the study, and treatment of the disease whilst actually engaged in a general practice through a period of more than twenty years, I have come to the following conclusions :

1. That true croup, pathologically considered, is a special or single disease ; being dependent for its existence, like tubercular phthisis, on a peculiar or specific cause.

2. That its distinctive and essential characteristics consist in an inflammation of the secreting surfaces of the fauces, larynx, and trachea, which is always productive of a membranaceous or an albuminous exudation.

3. That the membranaceous concretion, which is found coating the inflamed mucous surface of the parts in croup, is an exudation—not from the membrane itself, but is secreted principally by the muciparcus glands, which so abundantly stud the larynx and trachea.

4. That the exudative inflammation commences invariably in the superior portion of the respiratory passages, and extends from above downwards—never in the opposite direction.

1. The opinion that croup, in its access, is essentially one and the same disease—being only modified by epidemic influences, by difference in constitution, or by other fortuitous circumstances, is founded principally on the pathological fact, that the inflammation peculiar to this dis-

ease is always attended with an exudation of plastic lymph.

Not that I would here maintain with MM. Guersent and Bretonneau, that the perfect formation of a *false membrane* is necessary to constitute the distinctive character of croup, and that the cases where this is not formed are, as they declare them to be, instances merely of *false croup*; but this I affirm, that inflammation of the respiratory mucous membrane—whatever may be its grade—if unattended with an albuminous exudation—can no more constitute croup, than any of the various diseases of the lungs, or of their tissues, which are unaccompanied with a tuberculous deposition, can constitute true pulmonary phthisis.

I agree fully with Prof. Hasse,* that the exudation of croup may present various gradations, or different degrees of density. In some instances it consists of a tenacious mucus, wherein are suspended thin, membranaceous flocculi—or, in other words, the viscid mucus is blended with fibrin in various proportions; sometimes, again, of a layer, resembling both in color and consistency that which settles upon scalded cream; and sometimes of a firm and tough false mem-

* An Anatomical Description of the Diseases of the Organs of Circulation and Respiration. By Charles Ewald Hasse, M.D., etc. Sydenham Society Edition, p. 278.

brane of considerable thickness, and which extends not unfrequently from the fauces, throughout the greater portion of the air-passages. Not that this concrete albuminous membrane will be found to be present in all cases of croup, but it is here maintained, that the effusion of coagulable lymph is the essential pathological character of the disease ; and that the degree of density of the plastic exudation will depend upon the intensity of the inflammation, and the duration of the disease. When a child dies very early in the malady, says Dr. Copland,* instead of the formation of a concrete false membrane, the parts will be found coated only with a tenacious mucus, or fibrinous exudation. As the disease advances, this glutinous secretion becomes more condensed, and moulded into a false membrane, or it may be found having assumed a but partially concrete condition. “La présence de cette fausse membrane est le caractère anatomique fondamental de cette affection. Sans ce produit nouveau, il n’y a pas de croup. . . .

“Les fausses membranes sont exclusivement formées de fibrine.” †

That form of the affection which has been termed Spasmodic Croup by some writers, is a

* Dictionary of Practical Medicine. Article Croup.

† Manuel Pratique des Maladies des Nouveaux-Nés, et des Enfants à la mamelle. Par M. Bouchut. Article, Croup.

variety of this malady, and not a distinct disease.

When children of a nervous temperament, or of weak and irritable habits, are exposed to the ordinary exciting causes of croup, and become the subjects of the disease, we then have the spasmodic variety of the affection; or, in other words, the inflammation, under such circumstances, is of a sub-acute character; the albuminous secretion is more tardily effused; but there is present, from the commencement of the disease, a great predominance of spasmodic and nervous symptoms. The stricture of the glottis which attends this form of the malady is spasm caused by inflammation, occurring in weak children of the above nervous temperament.

This inflammation, Dr. Cheyne* observes, is often spontaneously resolved, the spasm depending upon it subsiding at the same time; and this has given rise to the opinion that there is a purely spasmodic species of croup—an opinion not sustained by the pathology of the disease. “With respect to the inflammatory and the spasmodic varieties of croup,” says Mr. Ryland, “I have before stated that this division can refer only to the predominance of either set of symptoms. The nature of the disease is

* Cyclopædia of Practical Medicine. Article, Croup.

essentially inflammatory, but in weakly, leucophlegmatic children, who are always more subject to nervous affections than the more active and healthy race, it sometimes assumes a spasmodic form, inasmuch as the vascular excitement is comparatively trifling, whilst spasm of the glottis and general convulsions occur frequently during the disease, and the remissions are singularly long and complete.”* The occurrence of short intervals of natural breathing, which take place suddenly, every now and then, in spasmodic croup, has been adduced by some writers as characterizing this form of the disease, and as indicating, they suppose, the non-inflammatory nature of the affection. But these remissions, which take place for the most part in the early stage of the disease, occur, not because there is no degree of inflammation present, and consequently, no obstructions from albuminous secretions, but for the reason that this last morbid condition is not of sufficient extent, at this period of the malady, to embarrass respiration, whenever perfect relaxation from the spasm takes place. As the disease advances, and the membranaceous exudation increases, and becomes denser, the remissions are less complete, and of shorter duration—the exacerbations more

* A Treatise on the Diseases and Injuries of the Larynx and Trachea. By Frederick Ryland, p. 127.

prolonged, and the cough and difficulty of respiration more severe.

M. Guersent, and other pathologists, have shown from the dissection of cases, where this spasmodic form of croup has terminated fatally, that "albuminous concretions—sometimes extensive, but more frequently consisting of small isolated patches, are found in the larynx ;*" and Dr. Williams, in a Treatise on Diseases of the Respiratory Organs, also affirms that "although the albuminous effusion is generally thickest and most tough in sthenic cases of croup, yet it is pretty abundant in asthenic cases ; so much so, that Andral and Gendrin consider plastic inflammation of the mucous membranes to be rather of the sub-acute, than of the most acute kind."†

Dr. John Ware of Boston, who, in his admirable "Contributions to the History and Diagnosis of Croup," has done more to elucidate the true pathology of membranous croup than any other writer in this country, makes two distinct varieties of the affection, in the pathology of which he thinks there is an original and essential difference.

These two forms of croup, Dr. Ware has distinguished as membranous and inflammatory

* Dictionary of Practical Medicine. Article, Croup.

† Ut supra, p. 140.

croup—the former being characterized by the presence of a false membrane in the air-passages, while the latter differs from the first variety only in the supposed absence of this adventitious membrane.

According to Dr. Ware, the severe form of the disease occurs much less frequently than the milder variety, is but little affected by any form of treatment, and is almost always fatal. Of one hundred and thirty-one cases of croup, observed by Dr. Ware, in the course of twenty-five years, twenty-two only of these were cases of true or membranous croup ; of which number nineteen died.

The principal grounds, with Dr. Ware, for believing that the two forms of croup are pathologically different from each other, are thus stated : “ The very great preponderance of fatal results, in the membranous croup, and a similar preponderance of recoveries in the inflammatory ; and the evidence which exists that in the few cases of recovery from the former, the membrane has been formed, and in the few cases on record of death from the latter, that a membrane has not been formed—afford strong reason for believing that the diseases are essentially different.”* And yet Dr. Ware, with much candor, observes

* Contributions to the History and Diagnosis of Croup. By John Ware, M.D., p. 12.

on another page, "that with our present amount of knowledge, he would not be understood even to assert positively, that they are not different manifestations of the same disease."*

In the above form of the disease—which has been considered as a single affection, it is not intended to include that hysterical affection of adult age, described by Dr. Cheyne, which not unfrequently assumes the character of croup; nor that disease of infancy, termed *laryngismus stridulus*, which, the above writer observes, ought never to be called croup, inasmuch as it is not attended with cough, and leaves, on dissection, no trace whatever of inflammation of the larynx.

The membranaceous exudation consequent upon violent inflammation of the air-passages during *measles* and *scarlatina*, and which sometimes appears about the fauces, and in the upper portion of the larynx, differs, according to modern pathology, from that which takes place in croup. The fluids having become vitiated in these diseases, there is secreted a much less amount of fibrin than takes place in primary croup; hence the false membrane is less consistent—less uniformly spread over the involved part, is friable, and prone to decomposition.

Although it is maintained that croup is essen-

* *Loco citat.* p. 3.

tially a single disease, being only modified by difference in constitution, epidemic influences, and other circumstances; yet it may with propriety be divided into *laryngeal*, *tracheal*, and *bronchial* croup, according to the seat of the greatest intensity of the inflammatory action; and inasmuch as "the treatment and the prognosis may be in some measure influenced by the locality of the disease," croup, moreover, may be complicated with, or be consecutive to, other affections of the air-passages. It may be associated with chronic bronchitis, and there is then presented that form of the disease which Dr. Rush denominated, *Cynanche Trachealis Humida*. In many cases, symptoms of acute bronchitis are predominant, but ordinarily in this form of the affection, the bronchial disease is consequent upon the exudative inflammation. In a large proportion of the cases of croup which terminate fatally, the inflammation will be found to have extended into the bronchi, filling, indeed, the terminal branches, and even the interstitial cells, with an effusion of serum, and it is this bronchial effusion which in some instances is the final cause of the fatal result.

2. The truth of the second proposition stated; namely, that the essential pathological character of croup is inflammation of the lining membrane of the larynx and trachea, attended by a concrete

albuminous exudation, is unanimously admitted by the best pathologists of the day.

The plastic exudation which is poured out upon the surface of the mucous membrane in croup, forms with great rapidity. It consists mainly of fibrin blended with mucus in various proportions ; and it presents different degrees of density, and varies much in thickness and extent of surface over which it is spread. In some cases, it consists of a tenacious mucus blended with a small proportion of fibrin ; sometimes of a dense, albuminous concretion ; and, again, it is found in the form of a thick adventitious membrane, extending from the epiglottis without breach of continuity to the extremities of the bronchial ramifications.*

3. With respect to the source of that peculiar exudation which is poured out upon the inflamed mucous surfaces in croup, I have before expressed the opinion that it is an exudation from the diseased follicles of the tonsils, larynx, and trachea.

Anatomy has revealed to us that the tonsillary glands are composed, almost entirely, of an aggregated mass of follicles, enveloped in folds of the mucous membrane ; that the lining membrane of the larynx is studded with mucous fol-

* A Treatise on the Diseases and Injuries of the Larynx, etc. By F. Ryland, p. 134.

licles, especially that portion of it which occupies the upper part of this organ. These glands, indeed, are very numerous in the thickness of the superior vocal cords, within the ventricles of the larynx, and in the folds of the mucous membrane, in front of the arytenoid cartilages. The lining membrane of the trachea is supplied still more abundantly than that of the larynx with the mucous cryptæ.

Now, it will be found, that wherever these glands are the most numerous in the air-passages, there, *ceteris paribus*, will the albuminous exudation be the most abundantly poured out in the inflammation of croup, and the adventitious membrane will be the densest and the most perfectly formed.

The fluid secreted by the mucous follicles of the air-tubes, being intended to lubricate these passages, is, in the normal condition of the glands, bland and transparent, not abundant in quantity, and possesses no qualities of an acrid or adherent nature.

It consists, according to late microscopic observations, of water combined with a viscid substance, which is termed mucus, and which constitutes about five per cent. of the whole amount.

When the mucous membrane of the larynx and trachea becomes the seat of the exudatory inflammation of croup, the glands which in health

lubricate its surface, are now found, from some peculiarity of irritation, to elaborate a vitiated fluid, or a fibrinous exudation, which, sooner or later, if the disease continues, is changed into an adherent false membrane, having generally its greatest degree of thickness in the larynx and trachea, but becoming thinner as it descends towards the bifurcation.

The opinion here adduced, that the plastic exudation in croup is poured out by the mucous glandulæ of the part, where the disease is located, finds confirmation in the interesting fact recorded by Prof. Hasse ; namely, that “filamentous bands are sometimes found between the plastic exudation and the mucous membrane, consisting merely of delicate fibrous threads *which dip into the orifices of the muciperous glands.*” *

In 1854, several years subsequent to the publication of this work, my colleague, Prof. E. R. Peaslee, published a most valuable and original Monograph on Croup, in which he maintains that the “false membrane is, in all cases, formed from the *plasma of the blood*, and consists principally of its fibrin ;” that the plasma, in inflammation of membranes, is exuded from the engorged vessels of the part, and upon the surface of the membrane ; that, in membranous croup the exu-

* Op. citat. p. 280.

dation is most abundant, and therefore the resulting membrane is thickest, on the surface where the mucous follicles are most abundant, because these cryptæ being "merely an inversion of the mucous membrane, here is a great amount of free surface, and a vast number of small blood-vessels inclosed within a very small space." *

4. I have, on a former occasion,† expressed the opinion that the physiological and pathological relations which exist between the throat and the respiratory tubes, are not justly regarded by medical writers, in describing the nature of those diseases which affect these different parts.

Affections of the throat are ordinarily arranged by nosologists in connection with those of the œsophagus : or are treated independently of those diseases which occur in the larynx, trachea, and bronchi.

Pathologically considered, the relation which exists between the fauces, tonsils, and pharynx, on the one hand, and the respiratory tubes on the other, is much more intimate and important than the connection which exists between the throat and the œsophagus.

In almost all the inflammatory affections of the air-passages, whether primary or consecu-

* On the Pathology and Rational Treatment of Croup. Dr. E. R. Pease, *American Medical Monthly*, Aug. 1854.

† See *Treatise on Diseases of the Air-passages*, etc. p. 24.

tive, the diseased action has its origin in the fauces and pharynx, and extends, by continuity, from thence to the respiratory tubes. This is especially true with regard to the origin and progress of the exudatory inflammation of croup. Here, the morbid action commences primarily about the fauces and the upper portion of the respiratory passage, and extends, universally, from above downward. Dr. Porter, I am aware, observes in his work on the "Surgical Pathology of the Larynx and Trachea,"* the effusion of coagulated lymph is very generally confined to the larynx alone ; but still, in a number of cases, the inflammation commences in the bronchial cells, and proceeds upwards in the windpipe.

But this view of the course of exudative inflammation is not sustained by the observations of modern pathologists. Professor Rokitansky, who is undoubtedly one of the first pathologists of the age, says, that the exudative process progresses from the epiglottis downwards, extending in some instances to the very minutest branches of the bronchi ; and that bronchial croup is a disease of youth and early manhood, and when occurring in the terminal branches of the bronchi, is always simultaneous with pneumonia,† and

* Ut supra, p. 36.

† Treatise on Pathological Anatomy, translated by Dr. J. C. Peters, pp. 22, 23.

consequently in such cases cannot be *true* croup. Prof. Hasse also, whose late work on Pathological Anatomy has been translated and published by the London Sydenham Society, observes with regard to the exudatory inflammation of croup, that its progress is invariably from above downward, and that it never spreads in the opposite direction. This law is so universal, that where plastic inflammation occurs in the bronchi of the adult, as the concomitant of pneumonia, it can only descend to the pulmonary cells, never mount to the larynx. *

This view of the progress of the disease has been confirmed by other pathologists, since the issue of the first edition of this work. In an excellent dissertation on the "History, Nature and Treatment of Croup," by Dr. Albert Newman, which obtained the "Fiske Fund Prize," awarded in 1855, the author says of the inflammation of croup, that "it commences generally in the fauces, sometimes in the larynx; but at whatever point it may commence, it extends *always downward, never upward*."† Prof. Peaslee says, also, in the essay to which I have referred: "The progress of laryngo-trachitis is invariably from above

* An Anatomical Description of the Diseases of the Organs of Circulation and Respiration. By Charles Ewald Hasse, M.D., etc., Sydenham Soc. Edition, p. 276.

† American Journal of the Medical Sciences, Jan. 1856, p. 114.

downward. The observations of the best pathologists have established this point. Generally, or at least very frequently, a catarrh commences in the nasal passages, and extends backward into the pharynx, then, descending into the larynx, continues such for a time, or at once merges into an inflammation. Often the pharynx becomes inflamed, and a false membrane appears upon it before the inflammation descends into the larynx and trachea. In some cases, the larynx may be the part first affected ; but if so, such cases are to be regarded as exceptional, and the inflammation never extends upward, but always downward, from that organ.”*

Let this important point, advanced in this last proposition, with reference to the pathology of the disease, be fully established, and universally understood by the profession, and it will be at once perceived what important results may follow the topical employment of appropriate remedial agents, in the early treatment of true inflammatory croup.

In the preceding brief observations on some manifestations in the especial pathology of croup, reference has not been had to other important points in its general pathology, to which it may be well briefly to allude.

From an examination of the tables given by

* American Medical Monthly, August, 1854, p 98.

M. Caillon, Ryland, and other foreign authors, it appears that croup is a disease of childhood, and attacks children most frequently between the second and tenth years. In this country, the age at which children are most liable to this disease, is probably from one year to eight years old.

There are few cases on record where it has occurred as early as the sixth month. In the table given by Ryland,* embracing the experience of some fourteen authors, it had been observed only once at the age of seven months, and never at an antecedent period.

With the morbid changes which are revealed by an examination of the bodies of children who have died of croup, medical men are now generally familiar. Ordinarily, the lining membrane of the air-passages, particularly that of the larynx and trachea, is found inflamed, its tissues tumid, and the entire surface of these parts is coated, either with an adventitious membrane, or a less densely formed albuminous exudation, varying in consistence according to the duration of the disease, and the intensity of inflammation which had been present. This exudation is composed almost entirely of fibrin blended with mucus, in various proportions.

In the first stage of the disease the plastic

* Loc. citat. p. 130.

exudation consists of a tenacious mucus, wherein are suspended shreds of coagulable lymph. In the second stage, the mucous surface of the larynx and trachea becomes partially or wholly coated with a membranaceous exudation of considerable density, and which is finally molded, in the last stage, into a firm, false membrane, extending sometimes throughout a greater portion of the air-passages, and pervading even the minute ramifications of the bronchial tubes. This membranaceous product, when first formed, adheres with considerable firmness to the mucous membrane; but after an interval, and as the inflammation abates, a watery mucus, or a mucopurulent excretion, becomes deposited beneath the plastic layer, which serves to loosen and to assist in detaching the adventitious membrane, when it is sometimes expelled by violent coughing, either in fragments or in a cylindrical mass, which represents the parts upon which it has been molded.

It is a mistake to suppose, as many do, that the secretion of the characteristic discharge of croup begins in the early stages of those catarrhal symptoms, which precede, frequently, for many hours, the development of true inflammatory croup. In the most violent and acute forms of the disease, the plastic exudation commences nearly simultaneously with the inflammation, to

be poured out upon the inflamed mucous surface ; but in some instances a preëxisting catarrhal stage, of several days' duration, may be present, before the occurrence of that peculiar inflammation which disposes the vessels of the membrane to exude the albuminous deposit. "No sooner, however," says Prof. Hasse, "does the catarrhal irritation merge into inflammation, than the plastic lymph is thrown out, and the parts immediately suffer that disturbance of nervous energy, which results from all violent inflammations."* Instances, too, may arise where the early occurrence of violent spasms shall destroy the patient, while as yet the exudation has assumed no degree of density, and it will then be found in the air-passages, presenting the appearance of a layer of viscid, whitish mucus ; or, at most, there may be perceived irregular fragments of adherent lymph in the glottis and larynx, but more particularly about the tonsils. "This glutinous exudation," Dr. Copland remarks, "becomes more and more condensed and molded into a false membrane, or partially assumes this state, as the disease advances."†

The membranaceous exudation differs much, not only in its density, but in its depth, and the extent of surface over which it is spread. It is commonly thickest in the upper and posterior

* *Op. citat.* p. 277.

† *Dictionary of Prac. Med.* p. 531.

part of the trachea. Dr. Ryland* observes that it ranges from half a line to a line and a half. Dr. Copland† considers a line and a half or two lines to be its utmost thickness, and Professor Hasse‡ remarks that its depth is extremely variable, but nowhere exceeds three lines.

Croup usually subsides after the occurrence of a single process of exudation; but cases are recorded where the inflammation has continued until the formation of a second, and even a third adventitious membrane. It is not therefore improbable, in the examples given by authors, where the albuminous deposit equalled two or three lines in thickness, that several successive layers had been poured out, during the severity and continuance of the inflammation.

Examples of the great extent of the false membrane are given by different writers. Bretonneau§ gives several instances of its extending in a connected and uniform layer, from the epiglottis to the rami of the bronchial tubes. Brichteau,|| Dr. Ryland,¶ and Prof. Horner,** of our own country, give instances of a similar extensive pervasion of the plastic exudation.

The post-mortem appearance of the mucous

* Op. citat. p. 135.

§ *Traité de la Diphtherite.*

† *Dictionary of Prac. Med.* p. 531. | *Précis du Croup*, p. 274.

‡ *Ut supra*, p. 278.

¶ *Ryland*, p. 134.

** *Pathological Anatomy*, p. 810.

membrane, subjacent to the membranaceous deposit, varies according to the intensity and duration of the disease. In the acute form of the affection, and particularly where death takes place early, the lining membrane of the larynx and trachea is inflamed, and sometimes even of a vermilion hue, throughout the greatest part of its extent. In other instances, and at a later period, it is found paler, and presenting in color a rosy tint only. Still later, as in the last stages of the disease, the redness of inflammation will have disappeared, and the mucous membrane will present its natural pale color. On this point, Dr. Ryland* has very properly observed: "It is not always possible to determine, from the results of an examination of the dead body, what was the state of parts before the final change took place, and this is especially the case with regard to inflamed membranes; in puerperal peritonitis, for example, which is unquestionably an inflammatory disease, and one the symptoms of which cannot readily be mistaken, how often do we find the peritoneum free from redness! The same observation holds good with regard to inflammation of the skin, the redness which exists antecedent to death vanishes most completely on the occurrence of that event. . . .

* Op. citat. pp. 135-36.

“It happens but very rarely that we have an opportunity of examining the state of the membrane in the first period of croup, before the formation of the albuminous concretion ; and it is on this account, in a great measure, that we seldom find any vivid injection of the parts, for the secretion of the lymph weakens the inflammation most commonly, and in the end puts a stop to it entirely.”

It has before been stated that croup is a disease of childhood, that it is essentially inflammatory in its nature, affecting especially the secretory surfaces of the larynx and trachea. But the question here occurs, and it is one which many able pathologists have endeavored to elucidate,—why does the inflammation of croup differ from the laryngeal and bronchial inflammations incident to childhood, and which affect the same parts with this disease ? Since the experiments, instituted by Jurine, Schmidt, and other essayists at the concours of Napoleon, to produce artificial croup in the lower animals (they having succeeded in producing a false membrane in the air-passages of young animals only), many pathologists have adopted the opinion that the peculiarity of the product in the inflammation of croup, is attributable to an excess of albumen in the blood of young children.

Dr. Copland, who strongly advocates this theory, affirms that he has "uniformly observed the fact: namely, that the quantity of fibrine and crassamentum in the blood taken from the patient, and of albumen in the urine, have been great in proportion to the inflammatory type of the disease, and the disposition to form a false membrane." On the other hand, Ryland, Williams, and other writers on the disease, attribute the peculiarity of the product of croup to the circumstance of the inflammation being more deeply seated than that of bronchitis; namely, in the cellular tissue that enters into the composition of the mucous membrane—from the secretory arteries of which the albuminous exudation is secreted. Although in most cases of croup the sub-mucous cellular tissue is infiltrated with serum, the effect of inflammation, yet according to Rokitansky,* it is not so, in all fatal cases of the disease. It is therefore an unsettled question in the pathology of croup, whether the albuminous product is owing to some peculiarity in the nature of the inflammation, or in the structure which is the subject of it.

* Op. citat. p. 22.

CHAPTER II.

LARYNGEAL AND TRACHEAL CROUP.

IN the preceding pages, I have taken a brief view of the opinions entertained by some of the best authorities, with regard to the nature and pathology of croup.

I have also alluded to my own views as to the unity of the disease, and the nature and origin of the product which constitutes its distinctive characteristic ; and I have endeavored to show, that the commencement of that exudative inflammation of the respiratory passages that occurs in true croup, is invariably in the upper portion of these tubes, and that the morbid action extends only from above downwards.

Guided by this view of the seat, progress, and pathology of croup, and an extensive experience in the topical treatment of other diseases of the air-passages, I adopted the determination several years ago to make the attempt in croup whenever opportunity should offer, to arrest the exudatory inflammation, and thus prevent the formation of a false membrane ; or, when formed, to promote its separation and consequent ex-

pulsion by the employment of topical applications to the mucous surfaces of the fauces, larynx, and trachea.

A part of the results of these efforts will be found in the history of the following cases.

In the treatment of croup with topical remedial measures, I have always employed a solution of the nitrate of silver, as, in my opinion, there is no known therapeutic agent, which for safety, efficiency, and certainty of action, can compare with the crystals of the nitrate of silver, in the local treatment of laryngeal, tracheal, and bronchial affections.

In preparing the solution, the pure crystals should be employed, and not the fused or solid nitrate, as the latter is much more likely than are the crystals, to contain the nitrate of potash, or copper, or lead in combination. A solution of the crystals, of the strength of from two to four scruples of the salt to an ounce of distilled water, when applied freely to the mucous membrane, does not act, as has been supposed, by burning, or by a destruction of the textural matter. It forms, immediately, a union with the albumen, and other secretions of the mucous lining; whilst it operates, at the same time, to produce a most favorable change in the vital action of the parts.

The first favorable opportunity which pre-

sented itself for the employment of nitrate of silver, as a topical remedy, in croup, came under my notice in November, 1842.

CASE I.

On the evening of the 20th of November, 1842, I was called to see John S——, aged three years, the son of a widow woman in this city. He was in the last stage of croup, having been attacked with the disease about a week previous to the time of my being called. Catarrhal symptoms had preceded, for several days, the full development of the croupal stage.

The ordinary remedies had been employed, but without arresting in any degree the progress of the disease. The great prostration, the stridulous respiration, and other symptoms of threatened suffocation, which were present, indicated the stage of collapse, and that no relief could be expected from the employment of common means. Under these circumstances, I proposed the cauterization of the larynx, with the hope that some relief might be obtained from this operation.

The proposition being acceded to by the friends of the little sufferer, I proceeded at once to apply a solution of the nitrate of silver, of the strength of twenty grains to the ounce of

water, freely to the fauces, and into the cavity of the glottis. The application was followed by a violent expulsive cough; by which a large quantity of ropy mucus was discharged. Considerable relief followed this operation; the respiration became much less embarrassed, and so continued during a greater part of the following night. Towards morning, however, the croupal symptoms recurred with much violence, and when I saw my patient at an early hour the next day, the prognosis appeared so unfavorable, that I did not deem it advisable to renew the application.

The patient died the same day. No examination of the body was made.

This case is adduced as being the first instance, in my practice, where a successful attempt had been made to introduce the nitrate of silver into the larynx of a child affected with croup. During a period of nearly four years, previous to this time, as may be seen by referring to my work on Diseases of the Air-Passages, I had been constantly using this remedy, locally, in chronic laryngeal and bronchial diseases of adults.

But up to this period, such were the prejudices against its employment, and such the skepticism of a large proportion of the profession on the subject of topical applications to

the larynx in cases of adults even, that hitherto I had not ventured upon its use in the treatment of disease in young children. The marked relief which for a time followed its employment in the above case, although adopted as the "ultimum remedium," in the hopeless stage of the disease, and the small amount of irritation caused by the application, encouraged me to repeat the remedy on subsequent occasions.

CASE II.

Oct. 19, 1845.—I received a message to meet two medical gentlemen in this city in consultation, in the case of an interesting little daughter of Mr. H., who was reported to be dying of croup.

On repairing to the house, I found the medical attendants in waiting, from whom I received the following history of the case. The little patient, who was three years old, had been suffering, for several days previous to the attack of croup, from a hoarse cold, which was attended with a dry, barking cough. No alarm, however, was awakened in the minds of the parents until the evening of the 18th, when the child was suddenly and violently seized with croup. The family physician was immediately called, by whom the usual remedies were promptly em-

ployed. No relief, however, following these measures, a consulting physician was called the next day, and other active measures were adopted. But the disease progressed with great rapidity until the evening of the 19th, at which time I was called.

On entering the room, I found the child struggling for breath, for respiration seemed to be performed with the greatest difficulty. The head was thrown back ; the lips and face were livid ; and the whole countenance was expressive of the greatest anxiety. It was proposed that I should attempt to cauterize the larynx ; but so near suffocation did the child at this time appear to be, that I declined attempting to perform the operation, unless the attending physician would state to the friends of the patient its present hopeless condition ; for I feared that the impending fatal termination, which seemed so likely to follow, might be attributed to the effects of the application. This was done ; and, at the request of the father of the child, and the medical attendants, I proceeded to apply a strong solution of the crystals of nitrate of silver (forty grains to the oz. of water), to the interior of the larynx. To effect this the head of the child, thrown back, was held firmly by an assistant, the tongue depressed, and a small, round sponge, fastened to a bent probang of

whalebone, and dipped in the solution, was passed over the top of the epiglottis, and pressed suddenly downwards and forwards, into the cavity of the larynx. A convulsive cough followed this operation, and a large quantity of dense, adhesive mucus was discharged, in which traces of the false membrane were observed; and, adhering to the sponge, also, were found fragments of the same albuminous concretion. The respiration, soon after this, was in some degree relieved, the countenance was not so livid, and there was less jactitation. After a delay of nearly two hours, during which there was no increase of the distressing symptoms, the application was repeated. The same results followed the second application, that attended the first; and the embarrassed respiration was decidedly more relieved.

The second cauterization was made at eleven o'clock in the evening. One grain of calomel was ordered every three hours during the night, and I was requested to meet the attending physician at an early hour the next morning, and renew the application.

At seven o'clock, the hour of consultation, the next morning, although we found our patient still oppressed by the impeded respiration, yet the breathing was slower, the countenance less anxious, and in no respect was she worse than

when we left her the night previous. It was concluded to repeat the cauterization, and the nitrate of silver was again applied freely about the fauces of the child, and to the interior of the larynx ; and at this time the operation was followed with even more relief than had attended the previous application.

I did not see the patient after this time, and the subsequent history of the case was furnished me by the attending physician, who stated, in substance, as follows :—That after the application of the nitrate of silver, in the morning, the child discharged a great quantity of ropy mucus, and appeared more relieved of the croupal symptoms than at any time before. At twelve o'clock, when he called, he found the little patient sitting up in the cradle, breathing with more freedom, and “ looking as if she might recover.” These favorable symptoms continued until three o'clock, when the hour came for administering the grain of calomel, which, at longer intervals was still continued.

In doing this, the child resisted with considerable violence ; and, caused either by the efforts of the patient, or the irritation of the medicine, this was followed by a spasm, and a return of all the unfavorable symptoms ; and these continuing to increase, the death of the child took place a few hours afterwards.

I have always been of the opinion that this case would have terminated favorably if it had not been for the occurrence of the above untoward circumstance.

An examination of the body was requested, but could not be obtained.

It is well known that marked remissions of the unfavorable symptoms will not unfrequently occur in some cases of croup ; and this is particularly true with regard to that form of the disease which early assumes the spasmodic character.

But the almost entire relief which for a time followed the employment of topical medication in the suffocative and hopeless stage of the two preceding cases, was certainly unusual, and led to the conclusion that the same measure might prove quite successful if adopted in the access of the disease, or before the exudative inflammation had extended into the trachea and the bronchial divisions. By the occurrence of the following cases the opportunity was presented for the local employment of nitrate of silver in the early stage of the affection.

CASE III.

Several years ago, a son of Mr. and Mrs. W., of Franklin street, a fine healthful child of four

years old, was attacked with membranous croup, and, notwithstanding the most energetic measures were adopted, died of the disease after a few days' illness. Some time after this, another son, only a little younger than the first was at the time of his death, was similarly attacked, and died of the disease in about the same period of time. In November, 1847, the only remaining child of these parents, an interesting daughter of eighteen months old, was violently seized with the same disease of which her brothers had previously died. Several hours after the occurrence of the croupal symptoms in this case, very late in the evening of Nov. 20th, 1847, I was called to see this child, and found her exhibiting all the symptoms of a severe attack of membranous croup. The heated skin, the frequent, oppressed, and stridulous respiration, the dry and ringing cough, "tussis clangosa," and the appearance of the tonsils and pharynx, which were highly inflamed, and coated with an albuminous exudation, left no room to doubt the nature and the stage of the disorder.

For two or three days before the disease had merged into true croup, the child had been laboring under catarrhal symptoms, which were attended with hoarseness, and a dry, hard cough.

Immediately on my arriving at the house, ar

finding the patient in the above condition, I determined to try the effect, in this early stage of the disease, of remedies applied directly to the inflamed mucous surfaces. But in order, at the same time, to secure the aid of general remedies, I ordered the administration of a few grains of ipecacuanha, and, after waiting several minutes, followed the medicine with the application of the sponge dipped in solution of nitrate of silver, of the strength of forty grains to the ounce of water. With this, the fauces, pharynx, and the laryngeal face of the epiglottis were well cauterized, and at the same time the sponge, wet with the solution, was carried into the larynx.

As in the preceding cases, this operation was followed by a cough, and an effort at vomiting; by which a large amount of glairy, adhesive mucus was discharged, commingled with which shreds of the false membrane were distinctly visible. Within fifteen minutes the child breathed with more freedom, and there was an equally favorable change in the dry and ringing cough. Expecting to repeat the application, I remained a short time with the patient; but there was such an improvement in all the croupal symptoms, that no further application of the caustic was made that night. Five grains of calomel were directed to be given to the child; an eme-

tic of ipecacuanha and tartarized antimony was ordered to be administered in the course of the night, if at any time there should be an increase of the peculiar symptoms of the disease.

At an early hour the next morning I visited my patient, and found she had passed a night of comparative comfort. The respiration was not so laborious as when I left on the previous evening, the cough was less croupal, and the heat of the surface was greatly diminished. The calomel had moved the bowels, and as the patient continued to improve during the night, the emetic was not given.

The same favorable indications continued during the day; but about nine o'clock that evening a message was received from the alarmed parents, requesting my immediate attendance, for their child, as the messenger reported, was suffering from a return of the croup. I found a recurrence of the same symptoms that had been present the preceding evening; but they were much less in degree, and a single application of the nitrate of silver to the larynx, which I made at once, relieved, in a short time, the embarrassed respiration, and lessened the croupal cough.

The patient again passed a comfortable night, and the next day when I called, she appeared quite cheerful, and apparently almost free from

disease. From this time no further medication was needed ; the child has since passed through a severe winter without the recurrence of any symptoms of laryngeal disease.

The above case occurred in a family whose children were predisposed to the disease ; and in its access and development, the affection presented all the symptoms of true, membranous croup. With the exception of the small doses of ipecacuanha and calomel which were given on the evening of the attack, no other means were used but the local employment of a strong solution of the crystals of nitrate of silver to the seat of the disease.

During the months of February and March of the present year (1848), the occurrence of croup among children, in this city, has been more than ordinarily frequent. This is to be attributed, undoubtedly, to the epidemic influence of the atmosphere, which, for some cause, has been in a condition to favor the development of influenza, and other diseases of the respiratory organs, in adults, and of croup in children.

The following cases appeared during this period ; they took place in a family where croup had before occurred, and in one or two instances had proved fatal.

CASE IV.

At a late hour in the evening of the 23d or February, the Rev. Dr. B——, of this city, called at my office and desired me to accompany him to see his little daughter, a child three years of age, who that evening had been violently seized with an attack of croup.

She had been hoarse, and had had a rough, dry cough for several days previous to the full development of the affection. When I saw her a few hours after the occurrence of the disease, the symptoms of croup, which were present, were marked and severe—indeed, as I entered the hall of the house, the ringing cough and stridulous respiration of the child—sounds which no physician ever desires to hear a second time, were distinctly audible through the closed doors of the chamber above.

With the aid of Dr. J. Hancock Douglas, who was in the office when the father of the sick child called, and who accompanied me to his house, I succeeded in obtaining a good view of the throat of the little patient. The parts were highly inflamed, and the tonsils were covered with an albuminous exudation. The barking cough and the embarrassed and tracheal respiration plainly indicated the stage of the dis-

ease, and that the inflammation had extended to the larynx, and about the vocal chords.

As no time was to be lost, I immediately administered ten grains of ipecacuanha, and after waiting fifteen minutes, prepared to cauterize the diseased parts.

Assisted by Dr. D——, I applied a solution of the nitrate of silver (forty grains to the ounce), to the fauces and pharynx, and also introduced the sponge saturated with the solution, into the cavity of the larynx. The introduction of the instrument was followed by a free discharge of muco-fibrinous matter, in which, and also on the sponge, were shreds of the membranous deposit.

The little patient, very soon after the operation, appeared greatly relieved.

We remained nearly an hour after the application, in order to repeat it if the symptoms should indicate its necessity ; but the child continuing to improve, we left for the night, after giving directions to have an emetic of ipecacuanha administered should there be any increase of the embarrassed respiration. Soon after we left, the child fell asleep, and although the breathing was labored, and the cough, which occurred often during the night, was croupal, yet she slept for several hours, and when I called the next morning, I found a great improvement in all the above symptoms. The emetic had not

been given. As there still appeared to be some inflammation about the throat, and the cough retained the peculiar sound of the disease, I had fears that there might be a return of all the unfavorable symptoms before night, and therefore concluded not to wait, but to repeat the application of the nitrate of silver to the diseased organ. This was done, and I feel confident the operation was attended with much advantage, for instead of having a recurrence of the croupal symptoms on the second night, as had occurred in a former instance (Case 3), and which is so likely to follow a remission of the disease in most cases, there was a constant improvement of all the croupal symptoms during that day, and the following night was passed with equally favorable indications.

In short, after this date no further medication was needed, for the child rapidly recovered.

CASE V.

While in attendance upon the above case, a second child in this family, a little daughter, nearly eight years of age, was likewise attacked with the disease.

It had been observed by the mother, that she, like her younger sister, had been hoarse with a severe cough for a number of days. For these

symptoms, occasional doses of syrup of ipecacuanha, or of hive syrup, had been administered by the parents. But notwithstanding the use of these expectorants, croup supervened on the above symptoms, which, although well marked, was not developed with quite that degree of severity that attended the onset of the disease in the preceding case. Being at the house soon after the access of the disease, I applied the cautery immediately to the inflamed mucous surface of the throat and larynx.

It will be unnecessary to repeat the details of the treatment in this case. Two applications only were made on the evening of the attack, and one on the following day. The only general remedy administered, was a laxative dose of calomel. The croupal symptoms, which were greatly lessened by the first and second applications, disappeared altogether after a single employment of the local remedy on the second day.

CHAPTER III.

MEMBRANOUS CROUP, COMPLICATED WITH BRONCHIAL INFLAMMATION.

THE preceding cases of croup, with the exception perhaps of the first, may be termed instances of laryngeal, or tracheal forms of the disease. The bronchial variety, or that form of croup which is complicated with inflammation of the bronchial tubes, is described by most authors as commencing with catarrhal symptoms. There is, soon after the access, and in some instances from the invasion of the disease, a croupy character of the voice, dependent upon the exudative inflammation which distinguishes it from a purely catarrhal or bronchial affection. This distinction, be it remembered, is not founded upon any pathological difference in the nature of croup, for it is maintained that the peculiar inflammation of croup has its origin in the superior parts of the respiratory passage ; and that this inflammation, if continued, will extend not only along the trachea, but into the ramifications of the bronchi ; and we then have the sibilous respiration, the suffocative cough, and

the lividity of the countenance, which distinguish this complicated form of the disease.

The danger of an unfavorable termination, it is considered by Ryland and others, will be in proportion to the rapidity with which these several stages follow each other.

Although the chances of success, in the employment of the nitrate of silver as a topical remedy, are greatly diminished when the exudative inflammation has extended into the bronchi, yet, as the application of it does not preclude the adoption of other measures, its employment, even when there is a predominance of bronchial symptoms, should in no wise be neglected.

In the following case, though unsuccessfully employed in the advanced stage of a case of bronchial croup, yet such was the effect of the nitrate of silver, in mitigating the croupal symptoms, and in relieving the oppressed and stridulous respiration, as to encourage perseverance, and awaken hopes of final success, in some cases of the complicated variety.

CASE VI.

Feb. 28, 1848.—Was requested to meet Dr. Spears, in consultation, in a case of croup, in the daughter of Mr. N., of Sidney Place, Brooklyn;

This child, aged two and a half years, had exhibited, as I learned from the attending physician, symptoms of croup complicated with catarrhal or bronchial disturbance, for nearly a week before the full manifestation of the disease. During the last twenty-four hours all the symptoms had become greatly aggravated, notwithstanding appropriate and energetic measures had been employed, by the attending physician, to check the progress of the disease.

I found the child oppressed with a most difficult and laborious respiration ; there was great restlessness ; the voice was reduced to a whisper ; whilst the choking cough, the livid lips, the constant heaving of the thorax, and the sibilous respiration, indicated the complicated nature of the case, and the advanced stage of the disease.

After examining the case, I expressed my fears that permanent benefit would not follow the employment of topical remedies at that stage of the affection, especially as applications could only be made to a portion of the diseased membrane. As the attending physician and the parents were anxious to have a trial made, I applied a strong solution of the nitrate of silver to the fauces, pharynx, and on both faces of the epiglottis ; and then, after a delay of ten minutes, I passed the sponge of the probang

through the aperture of the glottis, and freely cauterized the interior of the larynx. For a few moments the cough was more violent, and the respiration appeared more embarrassed. But during this time, a large quantity of muco-purulent matter was discharged, or was wiped from the mouth of the patient, commingled with which were many patches of false membrane.

The respiration, soon after this, was much easier; but more especially was this the case, after a second application, which was made in the course of half an hour, and which was followed by a like free discharge of viscid, yellow mucus, and a decided improvement in the choking, croupy cough and respiration. Indeed, although this patient did not ultimately recover, the symptoms of tracheal croup were at no time thereafter so severe, as before the nitrate of silver had been applied to the parts.

These applications, conjoined with appropriate general treatment, were repeated at intervals for several days, and always with more or less relief to the embarrassed respiration; but the bronchial affection continuing, pulmonic inflammation supervened, and the child sank under the disease, and died on the thirtieth of the month, although the peculiar symptoms of croup, as the attending physician informed me, had nearly disappeared before the death of the patient.

I have alluded to the difficulty of reaching the whole surface of the diseased membrane, where, as in the preceding case, the exudatory inflammation has extended through the larger bronchi into their minute ramifications. But, even when this is the case, we should not be deterred from the employment of the nitrate of silver as a topical remedy, if it shall be found that, when it can be applied, its influence upon the mucous membrane is always salutary ; for, it is now an established fact, that a solution of nitrate of silver, of sufficient strength to arrest inflamed action, may be introduced in considerable quantities below the epiglottis of adults, and thus be diffused with certainty over the surface of the bronchial membrane.

Among the patients who during the last few years have come under my care, for the treatment of chronic laryngeal and bronchial disease, are a number of intelligent physicians. Several of them have informed me, repeatedly, that after having a few applications of the solution of nitrate of silver into the larynx, they have felt the fluid distinctly extending down the bronchial tubes. Often, in these cases, no taste of the medicine would be observed, until matter, by coughing, was expectorated from the air-passages, when the peculiar flavor of the nitrate of silver—a most acrid bitter—would be perceived ; and

this would continue to be observed, whenever the individual expectorated, for many hours after the operation ; thus conclusively demonstrating, as it did, to those gentlemen, that the solution had pervaded the bronchial divisions. Another point, connected with this matter, is the interesting fact, that much less mechanical irritation is produced by the application of the nitrate of silver into the larynges of young children, who are suffering from croup, than when it is introduced into those of adults, who are affected by chronic diseases of the larynx.

In applying this remedy, in the preceding case, it was observed by Dr. Spears, with much surprise, and the same fact has been remarked by myself in other cases, that after the first application of the solution to its larynx, this child, as if fully conscious of, and seeking for the relief it afforded, would open her mouth to receive the probang, whenever the physician approached for the purpose of repeating the operation.

In the treatment of croup, therefore, where the plastic exudation has extended into the ramifications of the bronchi, or where the primary affection is complicated with bronchial disease, a still more free use of the solution should be employed, in order that some part of the fluid may find its way over the diseased mucous surface of the lesser branches of the air-tubes.

Acting upon this plan, the following case of croup, complicated with bronchial disease, was successfully treated by the topical employment of the nitrate of silver.

CASE VII.

In the early part of the spring of the present year, M. M., of this city, called on me, and requested me to visit his little daughter, who, under the care of his family physician, had been sick with the croup for nearly a week, and was then dangerously ill.

One or two of his children had already died of croup, and the array of symptoms which I found here presented, indicated an equally unfavorable termination of the disease in the case of this child. From the history given, as well as from the symptoms present, I found that bronchial inflammation had become complicated with the croupal affection soon after the attack. The symptoms present at this stage of the disease were not dissimilar to those that existed in the latter stage of the case last recorded. There was oppressed and stridulous respiration; the voice was reduced to a whisper; the characteristic croupy cough was present, but more suffocative and bronchial than when occurring in simple croup; and complicated with these

symptoms were further indications of extensive bronchial disease. Throughout the left lung, especially, of this patient, the sibilant respiration and other evidences of the affection were most apparent.

The ordinary general treatment usually adopted in such cases had been judiciously and perseveringly employed for several days by the attending physician, apparently without arresting in any degree the progress of the disease.

I proceeded at once to cauterize the diseased organs, and having applied a strong solution of the nitrate to the fauces, pharynx, and about the glottis, passed the sponge well filled with the fluid into the cavity of the larynx. As had occurred in other cases, this operation was followed by a free expectoration of muco-purulent matter, large quantities of which adhesive discharge were wiped from the mouth of the patient, in which, and adhering also to the sponge of the probang, were many small fragments of the false membrane.

These first applications were made about four o'clock in the afternoon ; at eleven o'clock at night they were repeated, when other portions of the adventitious membrane were ejected ; and within half an hour after the last application, there was a decided improvement in all these unfavorable symptoms.

As the child was greatly enfeebled, not only by the severity of the disease, but from the energetic practice which had been employed, a stimulating expectorant was the only remedy ordered; anodyne and slightly irritating fomentations were applied to the chest; and a bland, supporting diet was directed.

On calling at an early hour the next morning, the attendants reported the patient as having passed a better night than had occurred to her since the first attack of the disease; and the appearance of the child indicated a favorable change in all the unpromising symptoms. The breathing was much less embarrassed, the pulse and respirations were diminished in frequency, and the cough had nearly lost its croupy character.

The same plan of treatment was continued, and from this period the patient recovered rapidly; and although it was several days before the voice was restored, yet vocalization returned, and the child was ultimately restored to robust health.

CHAPTER IV.

MEMBRANOUS CROUP COMPLICATED WITH SPASMODIC AND WITH BRONCHIAL SYMPTOMS.

It has been stated in the preceding pages, that that form of croup which some writers have denominated the spasmodic variety, is in fact different from the true inflammatory croup only in this respect, namely, that in such cases there is a greater predominance of spasmodic and nervous symptoms, whilst, on the other hand, there is a tardier tendency to the formation of an adventitious membrane

There is not a doubt, that in such instances as the following, patients are frequently cut off by the violence of the spasm before the plastic exudation has become in any degree condensed into a continuous membrane ; and it is from an examination of the morbid appearances manifested in similar cases that some writers have been led to adopt the conclusion, that there exist two distinct forms of the disease, in the pathology of which there is an original and essential difference.

CASE VIII.

On the night of the 1st of April, 1848, I was desired by Mr. Hall, of Amos street, to visit his son, a fine healthy fat boy, five years of age, who had an attack of croup. The disease had come on after an unusual exposure to the cold easterly wind which had prevailed during the preceding day. Early in that day the child had been allowed to stand for an hour or more at an open window, engaged in watching some boys who were flying their kites near by, until he was quite chilled by the cold atmosphere. The attack of croup, as might be anticipated, in one predisposed to the complaint, followed this exposure. This case was first seen by me about three hours after the development of the disease. The symptoms at this stage of the affection were uncommonly violent. The cough was croupal ; the face flushed ; the respiration was accelerated, stridulous, and greatly oppressed ; so much indeed was the breathing embarrassed, and so great were the struggles for breath, it was with much difficulty that the child could be held in his mother's arms.

On examining the throat of the patient no patches of the false membrane could be discovered about the tonsils, but the whole faucial

region was coated with a viscid exudation, and was, moreover, in the highest state of inflammation. Here then was a case where severe spasm existed in the early stage of exudative inflammation, before the fibrinous deposit had assumed a concrete form. Every physical or rational symptom of true membranous croup was manifested in this case in a prominent degree, except the formation of the pellicular membrane, and this unquestionably would have been deposited in a short time if the morbid action had not been arrested.

In order to excite vomiting, the syrup of ipecacuanha had been administered to the patient before my arrival, and at the suggestion of an officious neighbor, this had been followed by an infusion of lobelia, but no effect had been produced by either of these remedies.

Finding the symptoms so urgent—for immediate suffocation seemed impending—I determined to try at once and relieve the spasm by local applications to the larynx of the patient. Directing the child's head to be properly confined, I depressed the tongue, and passed a sponge saturated with a strong solution of the nitrate about the fauces and into the cavity of the larynx. A large quantity of ropy and adhesive mucus was quickly thrown off after the application. In a few minutes the respiration was less suffocative,

but not until after a second application, which was made within twenty minutes of the first, was the relief marked and decisive. In less than half an hour after the second thorough application of the solution to the diseased parts the child fell asleep, breathing comparatively with but little difficulty.

On calling the next morning to see my patient, he was found looking pale but cheerful, and was engaged at his play. He had passed the latter part of the night in a quiet sleep. His voice, although sounding hoarse when he coughed, was nearly restored; his pulse was natural, and his respiration almost wholly unembarrassed. The emetic had not been administered, nor was any other medical agent whatever employed in this case after I was called but the local application of the argentine solution to the mucous surfaces of the fauces and larynx. The recovery was rapid and permanent.

In this connection, I shall detail the treatment of but one other case of membranous croup as having come under my own immediate observation.

The interest connected with the following successfully treated case of membranous croup is enhanced by the fact that besides being one of the most severe and complicated cases of the disease that I have ever encountered, its pro-

gress, treatment, and the effect of the treatment employed, were observed by several intelligent physicians, not one of whom considered it possible to save the life of the child by means ordinarily employed in the treatment of croup.

CASE IX.

The daughter of Mr. Griffin, of Hudson street, came under my care for the treatment of croup, April 26th, 1848.

This child, who was three years and one month old, had been affected with a severe cold, which was attended by a hoarse cough for a whole week before the occurrence of the suffocative and alarming symptoms which characterize the full development of the disease. I was called to see this child on the morning of the 26th, and found the catarrhal symptoms present as above named. The hoarse cough, the heated skin, the restlessness, and the increased respiration of the child, awakened in my mind the suspicion that the patient was threatened with an attack of membranous croup.

Small doses of calomel and ipecacuanha were ordered every three hours during the day, these to be alternated with a weak solution of tartarized antimony. But I failed to do what should not have been omitted at this visit, namely, to

examine the throat for the purpose of ascertaining the presence of the false membrane, if it existed ; for I doubt not from the subsequent course and character of the disease, that its presence about the tonsils could have been detected at this stage of the affection.

About 8 o'clock of the following evening, I was sent for in great haste to see the child, and found her laboring under a most violent and fully developed attack of membranous croup. The flushed countenance, the accelerated pulse, the ringing cough, the oppressed and stridulous respiration, and the appearance of the fauces, which were entirely coated with a membranaceous deposit, made it impossible to mistake the nature or the grade of the disease.

The medicine being at hand, I immediately administered an emetic dose of ipecacuanha and antimony, and after a delay of fifteen minutes, the patient not vomiting and the respiration being greatly embarrassed, I proceeded to employ cauterization. A sponge dipped in a strong solution of nitrate of silver was applied to the tonsils, the mucous membrane of the pharynx, and then passed rapidly over the laryngeal face of the epiglottis and into the larynx itself. This operation was followed by immediate vomiting, and the ejection of a large quantity of tenacious, glairy mucus from the air-passages, in which

could be seen many broken portions of the false membrane.

After a few minutes, the patient breathed with more freedom ; but this partial relief continued for a brief time only, for at the end of half an hour the cough became more stridulous, and the respiration more embarrassed than it was before the application of the topical remedy. An emetic of sulphate of zinc in combination with ipecacuanha was now administered, by which full vomiting was produced.

As no permanent relief, however, followed these measures, but the disease, on the contrary appearing to advance, I proposed a consultation, and Dr. Cox, of Union Place, was called.

It was concluded in consultation to continue the topical applications, to administer small and frequently repeated doses of tartarized antimony, and to give two grains of calomel every second hour. The second cauterization was made at 10 o'clock, which brought away an increased amount of the adhesive mucus, and many shreds of the pellicular formation. The antimony, although given in large doses during the night, did not produce vomiting. This was only effected by administering the zinc and ipecacuanha, and whenever the above combination was given, it never failed to act as an emetic.

A third application of the caustic was made a little before midnight, and my assistant, Dr. Douglas remaining with the patient through the night, repeated the cauterization for the fourth time, about two o'clock in the morning. • At each application much mucus was discharged, commingled with which were many portions of the adventitious membrane. In every instance the operation was certain to be followed by a mitigation, to a greater or less extent, of all the distressing symptoms—the difficulty of breathing, the quickened pulse and respiration, would be for a time greatly diminished ; but not until after the fourth application, did this relief continue for any length of time. When I returned to the patient at five o'clock the next morning, I observed a marked change in the symptoms that were present. The croupal cough and the stridulous breathing were much lessened, but on the other hand, the increased heat of the surface, the bronchial cough, and the widely diffused râles, which were revealed by auscultation, throughout both lungs, indicated too plainly that the exudative inflammation had extended into the bronchial terminations.

At the consultation held soon after my first visit this morning, it was concluded to have a few leeches applied between the shoulders of the patient with the hope of arresting the bronchial

inflammation: to continue the calomel, and to repeat the topical measures during the day should there be an increase of the croupal symptoms. During the early part of the day, the case appeared to be somewhat improved by the bleeding and the other measures adopted; but towards night, the croupal symptoms returned with more violence than ever; and complicated with this we had extensive bronchial disease, occupying both sides of the chest. A blister was applied over the sternum, the topical applications were renewed, and the patient again vomited with the mineral emetic. Many portions of albuminous matter were again ejected by these measures, which served to relieve greatly the stridulous breathing; but by 10 o'clock at night, the respiration became more bronchial and rapid, the pulse was increased in frequency, and feeble; and although the croupal symptoms were decidedly relieved by the local applications, yet the little patient appeared to be fast sinking under the suffocating effects of the bronchial disease. In consultation with Dr. Cox it was concluded that depletion even by vomiting, could be carried no further, and that the spasm and bronchial irritation must be relieved, if at all by other measures. It was decided, therefore, to continue the cauterizations as required, and to administer the hydrocyanic acid, in drop

doses, every two hours. The excellent effects of this latter remedy were soon apparent. After two or three doses had been swallowed, the great restlessness, the almost constant suffocative cough, subsided greatly, and the ejection, after an application of the caustic, of a much larger amount of fragments of the false membrane than had before been discharged, afforded the greatest relief; so that towards morning, the child fell asleep, and for two hours slept quietly, and breathed with considerable freedom.

The next day the child appeared much prostrated, but the croupal symptoms had nearly disappeared, and the bronchial irritation was greatly lessened.

The hydrocyanic acid was continued for several days. Appropriate supporting means were employed, under the use of which the little patient was gradually restored to health and strength.

But notwithstanding convalescence took place in other respects, yet vocalization did not return till nearly eight weeks after the attack of the disease.

Pathologists have observed that croup usually subsides after the occurrence of a single process of exudation; but cases are recorded where the inflammation has continued until the formation of a second, and even a third adventitious membrane.

Such was the severity and persistence of the exudative action in the preceding case, that, as we had every reason to suppose, several successive layers of albuminous matter were formed in the larynx, and removed by the applications. Repeatedly, during the period of the greatest severity of the disease, after these cauterizations were made, many patches or fragments of the false membrane, some of considerable size, were at each time ejected from the air-passages. This occurrence was always followed with relief to the patient, and this relief would continue until the deposition of another membranous coating had taken place.

I shall conclude, for the present, my record of observations, by noticing a few cases of membranous croup which, in the hands of other members of the medical profession, have been successfully treated by means of the topical application of the nitrate of silver.

Within a few days the subsequent highly interesting case was communicated to me by my friend, Dr. James Bryan, of Philadelphia.

CASE X.

“DEAR DOCTOR :

“The following case of membranous croup, cured by the application of nitrate of silver, I send to you in accordance with your request.

You are at liberty to make whatever use of it you may think proper.

"On the 21st of April of the present year, I was called upon by my friend, Dr. T. Beasley, to see with him the only child of Thomas Hutchinson, aged 14 months, laboring under an attack of croup.

"Dr. B. informed me that this was the third day of the disease, and that the child had gradually grown worse, until the disease assumed the features presented at this visit.

"I fastened on the extremity of a properly bent whalebone a conical piece of sponge, and prepared a solution of the nitrate of silver, forty grains to the ounce of water. At seven o'clock, P.M., the child was lying on its back with the head thrown backwards spasmodically, and breathing with the greatest difficulty; the lips livid, the pulse small, thready, and very quick; a peculiar whistling sound was produced by the imperfect act of respiration. The fauces and throat, as far as vision, aided by depressing the tongue, would extend, were covered by a white, milky, sheet-like covering. The child was placed on the father's lap, the head supported by Dr. B., when I depressed the tongue by means of the bent handle of a silver spoon, and introduced rapidly into the larynx the sponge, saturated with the solution.

“ For an instant the spasm of the glottis produced apparently complete closure. This, however, was followed by relaxation, and a copious discharge of mucus, with long membranous shreds, which relieved the respiration very much.

“ 9½ o'clock, P.M. : The child has vomited freely in the interim, and respiration is some better. The application was made again, and was followed by a temporary spasm, and a copious discharge of a flaky and stringy mucus, as white almost as milk. A little blood was found mixed with it, which came apparently from the nose, which has been discharging blood every now and then since the commencement of the disease.

“ 22d, 8 o'clock, A.M. : The child has passed a tolerably easy night. Free bilious discharges have taken place from the bowels, produced by the use of two grains of calomel taken every two hours since yesterday morning. Respiration now is comparatively easy, the head is not thrown back as before, nor are the lips so livid. The child is enjoying a quiet sleep. The pulse is about 90, and regular. Ever since the first application, it has drunk freely of cold water, which it did not before.

“ The third application into the larynx produced less spasm, and very little irritation, but it was followed by a very free expectoration

of the same kind of shreddy and membranous substance, with a large amount of mucus. Continue the calomel two grains every few hours.

"7 o'clock in the evening: The child has had four stools during the day, is now lying languidly on the pillow with its chin raised, but quiet. Respiration dry and difficult.

"On account of the excitement of the child, the first attempt to cauterize the larynx was not successful, and it produced, which in fact is always the case, considerable spasm. The second attempt was perfectly successful, the sponge passing down more than two and a half inches, bringing up with it a quantity of white membranous mucus, and followed by a discharge of a large amount of the same kind of matter, almost without any effort of the child, who threw his head back, breathed easily, and went to sleep in a very few seconds.

"23d, 8½ o'clock A.M.: The respiration comparatively easy, slept well last night, has had four bilious stools. It is so much easier that we resolved not to apply the caustic at present, but to hold ourselves ready to do it during the day, should there appear immediate necessity for it.

"6 o'clock P.M.: The child was sitting up on its mother's lap, amusing itself with toys. A quantity of coagulated blood fills up the right

nostril. Respiration but slightly stridulous ; has eaten bread and milk ; had three stools since morning, and has slept very comfortably. The throat, as far as can be seen, is perfectly free from the *diphtherite* deposit. Continue calomel, half a grain every four hours, with one grain of quinine.

"24th: Saw the child this morning with Dr. Beasley. It was lying comfortably in the cradle ; very little impediment to the respiration ; has slept well during the night, taken nourishment, and passed three stools. The throat shows no appearance of deposit. The calomel diminished to one-eighth of a grain every four hours. The consultation to cease.

"It will be recollected that no emetic or other remedy than a few grains of calomel and the nitrate of silver has been administered in this case until last night, when the quinine was added. The patient recovered without an unfavorable symptom."

The history of Case 2 which is recorded on page 31 of this work, was given at a meeting of the "New York Medical and Surgical Society," November 1st, 1845, and the members present were desired to make trial of the local remedy whenever opportunity for employing it in croup might occur.

The next year a member of the Society, Dr. Wm. N. Blakeman of this city, reported to the Society two cases of croup which had been treated successfully by topical medication.

The details of these cases are recorded in the twenty-third number of the *New York Journal of Medicine*.

The first case, which is that of a large fat child two years old, and of a leuco-phlegmatic temperament, was seen by Dr. B. five hours after the attack. The skin at this time was hot and dry, the pulse quick, with great restlessness, laborious breathing, and the hoarse barking or crowing sound peculiar to croup. The tincture of sanguinaria with squills, and ipecacuanha, were first given, by which vomiting was produced, with no relief; six grains of calomel were then administered and the former mixture repeated, with the addition of five grains of tartar emetic; free purging and vomiting were produced, but with no relief. On the second day persulphate of mercury was given in doses of a quarter of a grain every hour, by each dose of which vomiting was excited, but without relief. In the afternoon of the same day Dr. Blakeman resolved to try a strong solution of nitrate of silver. The application was made by means of a sponge, and the solution used contained a drachm of the nitrate to an ounce of water.

The application brought away a quantity of tenacious membranous matter, and a larger quantity by the vomiting which soon followed. A second application was made ten minutes after, by which a still larger quantity was brought away, to the great relief of the symptoms. In five hours a third application was made with the same effect as to the discharge of membranous matter and the vomiting. The next morning the child was found entirely relieved from the disease.

In the second case, that of a boy six years old, with frequent pulse, skin hot and dry, breathing hurried and difficult, and loud crowing, the same application was made two hours after the commencement of the attack, when a discharge of tough phlegm took place and vomiting. After a second application the relief was complete.

Within the last year several other cases of croup have been communicated to me by medical gentlemen residing in different parts of the country, in which they have succeeded perfectly and with great satisfaction to themselves in arresting the disease, by the use of the topical measures I have recommended. I shall, however, in this connection subjoin the history of but one other case of membranous croup; one which was successfully treated by Dr. C. E. Ware,

of Boston, and was by him communicated to the *Boston Medical and Surgical Journal*. It may be found in the fourth number for December, 1847.

"I was called," says Dr. Ware, "to this patient, a boy five years old, Saturday, November 20th. The mother said that he began to breathe hard just a week previous, but as he had been subject to attacks of spasmodic croup, in several of which I had attended him, and usually found ready relief, she felt no great anxiety, especially as there was less constitutional affection than he had in former attacks. His tonsils, also, had been for a year or more somewhat enlarged, and often gave a huskiness to his respiration and voice. On Tuesday he began to cough, and evinced other signs of a cold. These symptoms continued, he playing about, and having appetite without anything very characteristic till Friday afternoon, when the cough began to have a ringing tone, and the respiration to be very labored. I was not called to him till the next afternoon. Then there was the characteristic breathing of croup well marked. It had become sufficiently distressing to occasion great restlessness and jactitation, but was not accompanied by much febrile excitement, nor as yet prostration. The general expression of the child was good. On examin-

ing the fauces they appeared red, and the tonsils presented distinct patches of lymph. On the backs there was an almost entire absence of respiratory sound, and no râles whatsoever. The breathing and cough were both dry, with very little râle in the trachea.

"He was ordered strong mercurial ointment, and fomentation to neck, and pills of Dover's powder and blue pill once in four hours, and a syrup with opium and ipecac. at intervals between. Under the influence of the opium he got more sleep than during the previous twenty-four hours, but in the morning was no better, nor essentially different.

"I now commenced the application of the nitrate of silver to the larynx, using a solution of the strength of a drachm to the ounce, and applying it with one of Dr. Green's whalebone staffs. I applied it twice in the course of the first day. The child the first time resisted violently, and I was obliged to use much force. But after having been persuaded once to submit quietly, the operation occasioned so little irritation that he never afterward made the least objection to it, but allowed me to perform it as effectually as I could have done upon a grown person. The first applications were followed by so much excitement that it was difficult to see what was the immediate effect. But afterward,

when he was more tranquil during the operation, it was obvious that it produced an increased dryness of the cough and respiration, without immediate relief or aggravation of the labor in breathing. In the course of the day he raised twice considerable pieces of false membrane, very well marked, and stained with blood, together with a great deal of very thick, tenacious mucus, which was also occasionally stained with blood. After the discharge of the false membrane the breathing became much easier, and was never again as labored as it had been before.

"The next day, Monday, the respiration, although improved, was still very laborious. There was yet great deficiency of respiratory sound in the backs, and absent of râles. After the application of the caustic, which was applied twice this day, the fauces appeared red, but there was no lymph visible. From this time the amendment, although slight, from day to day was constant, till Friday, the 26th. No lymph was seen upon the tonsils. The caustic was applied once a day. Friday night, the breathing was more labored than the night before, and Saturday morning I again saw lymph on the tonsils. Through Saturday and Sunday, however, he continued to improve, and Sunday evening uttered the first loud word which he had been able to speak since I had seen him. The

caustic was now omitted, as well as all his medicines. His appetite, which had never entirely disappeared, became more urgent, and he was allowed to eat freely. Indeed, his diet had been liberal throughout. The respiratory sound gradually returned to the backs, but continued, as it had done throughout, free from râles. The voice continues to improve, but still retains its huskiness. The caustic was applied twice the two first days; afterwards but once a day, the sponge never being introduced more than once at the same visit."

CHAPTER V.

OF THE TREATMENT OF CROUP.

As these contributions to the pathology and treatment of croup are not intended to constitute a complete essay upon the disease, I shall not stop to describe the symptoms or to discuss the etiology of membranous croup, but shall proceed to a more critical examination of both the topical and the general remedies which are indicated in the treatment of this affection.

Topical Medication.—Believing as I do, that topical medication is a measure of the highest importance in the treatment of membranous croup, I shall make no apology for giving to it a more extended consideration.

M. Bretonneau was among the first to recommend and employ the nitrate of silver as a topical remedy in the treatment of membranous croup: He made use, however, of a very weak solution (four grammes of the salt to thirty-two grammes of water), and directed its application to be made to the throat and the opening of the glottis. The instrument he employed, and his method of application, are thus described in a work by M. Berton, which has recently been

published in Paris.* “L'appareil est composé d'une éponge fine de la grosseur environ d'une noix, fixée au bout d'une baleine assez forte et recourbée, à la chaleur d'une bougie, à 5 ou 6 centimètres de son extrémité et presque à angle droit. L'éponge est imbibée d'une solution de nitrate d'argent (au degré de 4 grammes de ce sel pour 32 grammes d'eau distillée). Elle est introduite dans le fond de la gorge; l'épiglotte est soulevée et la solution exprimée au-dessus de la glotte.”†

It will be observed from the above extract that M. Bretonneau makes no attempt to pass the instrument below the epiglottis. The sponge attached to the probang, being saturated with the solution, is introduced into the throat, “the epiglottis is elevated (soulevée) and the solution expressed into the glottis.” ‡

The topical application of a solution of the nitrate of silver in membranous croup, has also been recommended by MM. Dupuytren, Trousseau, Guersant, Guiet, Bouchut, and other French practitioners.

M. Guiet, in his Thesis published in 1843,

* Formulaire Thérapeutique, etc. Concernant les Maladies de L'Enfance. Article, Croup.

† If the French anatomists will acquaint themselves with the position of the *living* epiglottis when in situ, they will find that this cartilage is always *raised*, except at the moment of deglutition.

‡ Ut supra, p. 81.

on the treatment of croup,* thus describes the method—as practised by M. Guersant in the Hôpital des Enfants—for applying the caustic solution to the fauces, pharynx, and to the opening of the glottis in such a manner as to cause some drops of the solution to penetrate into the larynx: “L'éponge convenablement imbibée de la solution caustique, et le malade solidement maintenu par une ou deux personnes vigoureuses, l'opérateur abaisse la base de la langue, avec la main gauche, armée d'une cuiller ou de tout autre instrument; en même temps il porte avec la main droite, la baleine dans la bouche; lui fait traverser rapidement cette cavité; porte l'éponge dans le pharynx après l'avoir promenade sur les piliers et les amygdales, s'il y existe des fausses membranes; la fait glisser profondément dans cette cavité le long de sa paroi postérieure, de manière à la loger, si c'est possible, entre cette paroi postérieure et l'épiglotte; puis, quand il se sent arrêté par l'orifice supérieur du larynx, il presse un peu sur cette éponge, de manière à en faire suinter quelques gouttes de solution caustique, et à en faire parvenir un peu dans le larynx.”*

The same author informs us that Professor Trousseau at the Hôpital Neckar has employed

* *Considérations Pratiques sur le Traitement du Croup.* Par P. R. L. Guiet, p. 22.

† *Op. citat.* p. 22.

with success a solution of the nitrate of silver as a topical remedy, in the treatment of a case of croup occurring in an infant of twenty months ; but to what extent the applications were made, or of the exact strength of the solution employed, we are not informed.

M. Bouchut, whose work on Diseases of Children* was published in 1845, alludes to this case of M. Trousseau, and adds that two other well marked cases of membranous croup in private practice had been successfully treated, by means of the above local remedy. The strength of the solution as recommended by Bouchut, is ten grammes of the nitrate of silver to thirty grammes of distilled water. The instrument of the operator, and the manner of applying the caustic in pseudo-membranous croup, is thus described : " Il faut avoir une pétite éponge fine, solidement fixée au bout d'une baleine courbée en crochet ; lorsque l'éponge est imbibée, on exprime légèrement et on la porte dans le pharynx et sur la glotte, afin que quelques gouttes du liquide caustique puissent pénétrer dans le larynx."†

The application of the caustic, says the above writer, should be made in the commencement of

* Manuel Pratique des Maladies des Nouveaux-Nés, et des Enfants à la Mamelle.

† Op. citat. p. 271.

the disease, or as soon as we perceive patches of the false membrane about the pharynx, and it should be repeated at least twice in the twenty-four hours. But he observes, and recommends, great caution in making the applications to the pharynx and over the glottis, lest too large a quantity of the liquid should drop into the larynx, and produce suffocation and death; or, at least, render it necessary to practise immediate tracheotomy. The following are the author's remarks on this subject: "Si la cautérisation de l'arrière-bouche et de la partie supérieure du larynx est avantageuse, elle a aussi ses inconvénients qu'il faut connaître pour tâcher des les éviter. La suffocation immédiate peut en être la conséquence, si l'on a laissé trop longtemps l'éponge sur la glotte, et si une trop grande quantité de liquide a pénétré dans le larynx. Cet accident est fort grave, car il peut déterminer la mort, ou au moins la nécessité de pratiquer aussitôt la trachéotomie."*

Bearing in mind these dangers, and advising great caution in its use, M. Bouchut commends the employment of the nitrate of silver as an important medication in the treatment of croup. And yet, neither Bouchut nor his confrères, to whom allusion has already been made, derived that benefit from the use of the nitrate which

* Op. citat. p. 272.

they might have obtained, by carrying their applications directly into the diseased larynx, instead of making them, as they do, only to the pharynx and the superior opening of the larynx — “l’arrière-gorge et l’ouverture supérieure du larynx.”

In employing the nitrate of silver as a topical remedy in the treatment of diseases in young children, I have not deemed it prudent or necessary to use a solution of the caustic of the strength recommended by Bouchut or Guiet. The former employed a solution in the proportions of one of the salt to three of water ; the latter, in the treatment of membranous croup, made use of a still more concentrated solution ; namely, equal parts of the nitrate of silver and distilled water. Ordinarily, I have applied in croup, a solution composed of from two scruples to a drachm of the salt, dissolved in one ounce of distilled water. A remedy of this strength I have applied freely to the fauces, pharynx, and into the larynx of young children, in a large number of cases during the last eight years, and in no single instance have I observed any indications of the danger of suffocation from its employment. On the contrary, I have repeatedly observed, and have once before remarked, that much less bronchial irritation is produced by the application of the nitrate of silver into •

the larynges of young children who are suffering from croup, than when it is introduced into those of adults who are affected by chronic disease of the larynx.

In cauterizing the cavity of the larynx in the above disease in adults, I have advised on a former occasion,* that the aperture of the glottis should not be passed until after the parts in the faucial and pharyngeal region had been prepared by having the solution applied for a few times to the pillars of the fauces, the epiglottis, and about the opening of the glottis. Proceeding in this manner, it has been shown that the instrument may then be passed into the larynx without producing half the amount of that irritation which its introduction below the epiglottis would have awakened without these preparatory steps.

Happily, it is not necessary to take these precautionary measures before employing the topical remedy, in the treatment of croup in children ; for, as we have seen, applications of the argentine solution of a proper strength may be employed without apprehension in these cases ; and these applications should be made promptly to the tonsillary and pharyngeal regions, whenever the symptoms present indicate the commencement of the exudative in-

* Treatise on Diseases of the Air-passages, etc. p. 199.

flammation in the mucous membrane of these parts.

The instrument which I have ordinarily employed for making direct medicinal applications to the fauces, and into the cavity of the larynx, in the topical treatment of croup, is one composed of whalebone, about ten inches in length, slightly curved at one end, to which curved extremity is securely attached a small round piece of fine sponge. (*See plate.*)

Care should be taken that the sponge be not only firmly fixed to the rod of whalebone, but that it be not of a size too large to pass the aperture of the glottis. Anatomists are aware that there is but a very slight difference in size between the larynx of a child of two years, and twelve years of age ; and that, at this period of life, the calibre of the tube is from three-eighths to half an inch in diameter ; consequently, if the sponge be formed so as not to exceed one-third, or one-half of an inch in diameter, it can be made, with slight pressure, to pass the aperture of the glottis, and to enter the laryngeal cavity.

The instrument being prepared, by suitably saturating the sponge with the solution to be applied, and the head of the child being firmly held by an assistant, and the base of the tongue depressed with a spoon, or any other suitable instrument, the operator carries the wet sponge

quickly over the top of the epiglottis, and on the laryngeal face of this cartilage ; then, pressing it suddenly downward and forward, passes it through the opening of the glottis, into the laryngeal cavity. If any patches of false membrane are to be observed upon the pillars or tonsils, the sponge should be passed freely over these parts, and also upon the posterior wall of the pharynx.

Not unfrequently, if topical measures are employed in the very onset of the disease, and before the exudative inflammation has extended much into the larynx, the affection may be arrested by one or two applications of the caustic solution to the fauces, and the opening of the glottis, without ever passing the instrument upon the mucous surfaces of the larynx.

In March, 1847, Dr. P., of this city, called at my office, and requested me to visit, with him, a young child, about two years old, who that evening had been attacked with croup. This child had been indisposed for several days, with a cold, and some slight affection of the bowels, but not until that afternoon and evening had symptoms of croup been present.

We found the patient with a croupal cough, stridulous and laborious respiration ; and, indeed, presenting unequivocal indications of the presence of the disease. The attending physician

had administered an emetic, and had adopted other ordinary measures, before calling for me. Discovering evidences of plastic inflammation about the throat, I advised the immediate application of the caustic to these inflamed parts, and, at the request of Dr. P., I applied a solution of the strength of forty-five grains of the salt to the ounce of water, to the tonsils, the posterior wall of the pharynx, and about the aperture of the glottis. Intending to follow this application with a second, and to carry the sponge into the larynx, if necessary, I remained a short time for this purpose; but, in less than half an hour after the first cauterization, the respiration became less embarrassed, the cough less croupal, and I left without repeating the local remedy. The next day, Dr. P., who remained with his patient all night, called and informed me that the child breathed with considerable freedom, and slept well a part of the night; that early in the morning, the respiration becoming again more stridulous, he deemed it advisable to make a second application of the caustic solution. After this was done, the croupal respiration and other symptoms of the disease subsided rapidly, and, by afternoon of that day, had all, or nearly all, disappeared.

Having seen, on several occasions, the local application of the nitrate of silver act promptly

and efficiently in arresting exudative inflammation in its formative stage, I have been led to consider it of the highest importance in the treatment of membranous croup, that the first indications of the disease should be observed, in order that, by the early employment of this local remedy, the specific inflammation may be arrested before it shall have extended into the larynx and bronchial divisions.

It is well known to the experienced practitioner that in many cases of membranous croup, the disease will come on in a manner so stealthy that plastic lymph will be found in some instances coating the tonsils and pillars of the fauces, before alarm has been awakened by the patient having manifested any rational symptoms of croup, unless it be those merely of a common cold, or slight hoarseness of the voice. It is seldom, indeed, that much hoarseness attends the ordinary cold of young children. When, therefore, this symptom is observed to be present, in catarrhal disease, especially if the child exhibiting it is of a family predisposed to croup, the physician should never omit to examine the throat of such a patient, in order to detect, and, if necessary, to be able to combat the earliest manifestations of exudative inflammation. During the more than ordinary prevalence of croup in this city last winter, a physician of my ac-

quaintance, whilst attending, in consultation, a fatal case of the disease in a family where one or two had already died of this affection, observed that another child, although apparently perfectly well, and engaged at his play, exhibited a slightly raucous condition of the voice ; and, calling the child to him, found, on examination, the throat to be inflamed, and the pillars and tonsils to be coated with several distinct patches of albuminous deposit.

The attention of the attending physician was called to these facts, and the threatened danger from such indications, pointed out. But, as the child had made no complaint, and the parents on being questioned, had observed no cough, or any other symptoms of indisposition in their child, the doctor believed that no cause of alarm existed, and, in a pleasant way, was disposed to laugh at the apprehensions of his professional brother. They proved, however, to have been too well founded, for, in less than three days from that time, the child was dead of croup.

If we admit that the peculiar inflammation of croup has its origin, ordinarily, about the tonsils and the opening of the air-tubes, we can understand how readily the application of the nitrate of silver to the parts about the larynx, may arrest the disease, if the topical remedy is employed in the commencement of the exudative process.

After the inflammation has advanced, and the surfaces of the larynx have become involved in the disease, the argentine solution should not only be applied to the tonsils and to the faucial region generally, but the applications must be extended into the laryngeal cavity.

If the exudations are not already formed into adventitious membrane, the employment of a few successive applications below the epiglottis may be sufficient to arrest the plastic inflammation altogether. But even in a more advanced stage of the disease, when, from its continuance, and the severity of the disease, we have reason to apprehend the formation of a false membrane or "tubular mold," throughout the larynx and trachea, we should not despair of removing the obstruction or of arresting the inflammation.

Mr. Ryland, who advances the theory that the inflammation in croup has its origin chiefly in the cellular tissue that enters into the composition of the mucous membrane, and not in the muciparous follicles themselves; and that the albuminous exudation is poured out by the secernent arteries of the cellular structure, admits that "after an uncertain interval, the mucous glands become consecutively affected by the inflammation, and secrete a quantity of their proper fluid, which assists in loosening and detaching the false membrane, and, except in a case

of relapse, puts a stop to its further formation." *

Now, it is to secure and expedite this very sanative process, that I would recommend the prompt application of the caustic solution to the diseased mucous surfaces within the larynx, in order to effect an expulsion of the false membrane which may have formed in that cavity; for pathologists, who have been accustomed to post-mortem examinations of children who have died during the latter stages of croup, have generally found that the lymph is partially detached from the lining membrane by an intervening layer of mucus; "and it has, therefore," adds the writer just quoted, "been considered an important indication to excite the action of the muciparous follicles, that by largely secreting their peculiar fluid, they may loosen the adventitious membrane and render its expectoration easy.†

When called, therefore, to a case of croup in this its second or developed stage of the disease—and unfortunately, it is not until this period of the affection that medical aid is resorted to in a large proportion of the cases of croup—the local employment of the nitrate of silver, conjoined with other appropriate measures, should be entered upon at once.

* Op. citat. p. 144-5.

† Op. citat. p. 155.

An application may first be made to the tonsils, and about the opening of the glottis. After a delay of from fifteen minutes to an hour, the operation may be repeated, and the sponge, wet with the solution, should then be passed into the glottis. The cauterizations may be repeated once in two, four, or six hours, according to the effect produced, and the intensity of the disease.

When the symptoms indicate that the disease has extended into the tracheal divisions, or when the affection is complicated with inflammation of the bronchi, the applications should be repeated more frequently, in order that some of the solution may find its way over the mucous surface of the larynx and trachea into the bronchial divisions.

CHAPTER VI.

DIPHThERITE, OR THE CROUP OF ADULTS.

THERE exists a form of exudative inflammation which M. Bretonneau calls Diphtherite, or croup of adults, but which is not exactly identical with the croupal inflammation of children. The same parts, however, are affected in both diseases, and they both end in the effusion of plastic lymph ; but true croup ordinarily commences with catarrhal symptoms, is more sthenic in its nature, and is confined in its attacks to children and persons before the age of puberty, whilst the above form of disease commences with pain, redness, and swelling of the tonsils and back of the throat generally, and attacks, moreover, individuals of all ages, but those especially who have become debilitated by other diseases.

The diphtherite proves frequently fatal. M. Louis, who, under the name of "Croup chez l'adulte," describes the disease, records only one case in which a cure was obtained by medical treatment. "It causes death," Mr. Ryland remarks, "very rapidly, when the morbid action

has reached the air-passages, because the larynx is always affected ;” in Louis’s cases the patients never lived longer than from eighteen to thirty-six hours after the moment when we might presume, from the alteration of the voice, that the false membrane had reached the larynx. Diphtherite occurs frequently as an epidemic, and is considered by M. Bretonneau as decidedly contagious, especially when combined with scarlatina, which is one of its most frequent complications.

Still further to illustrate the nature and cause of this disease, and the effects of topical remedies in its treatment, I shall here introduce the two following cases of diphtherite, which have been recorded by Ryland,* together with a third, which came under my own observation, and which was brought to a successful termination by means of the topical application of the nitrate of silver to the diseased parts.

CASE XI.

The patient, a strong boy ten years old, began to experience some difficulty of swallowing on the 1st of January. On the 4th, the tonsils were greatly swollen, and, as well as the uvula, were covered with a greyish concretion ; respi-

* Op. citat. p. 164-6.

ration frequent, and attended by a guttural sound ; tumefaction of the cervical glands near the angle of the jaw. Pulse 94 to 96. Application of concentrated muriatic acid to the fauces, and a grain of calomel to be given every hour.

On the 5th and 6th, the state of the patient continued the same, except the swelling of the glands increased.

7th. Deglutition performed with greater ease ; tonsils less swollen, but still covered with false membrane ; tumefaction of the cervical glands remarkably diminished. The calomel was discontinued.

8th. Swelling of the glands again augmented ; inspiration attended by a hissing noise ; croupal cough. At eleven o'clock the dyspnœa increased, and death took place. Twenty minutes after death tracheotomy was performed, and artificial respiration had recourse to, but with no beneficial effects.

Dissection.—The lungs were healthy ; the mucous membrane of the bronchi pale ; that of the trachea, toward its middle parts, partially reddened, and covered with a tubular membranous concretion, which was loose at its lower extremity, but became thicker and more adherent in the larynx, and less so again on the epiglottis.

The whole of the back of the fauces, the upper part of the pharynx, and the posterior orifice of the nostrils, were covered with membranous concretions, having a most intimate adherence to the parts on which they lay.

CASE XII.

A woman, aged 72, had, when she was first seen, suffered for some days from sore throat, for which leeches had been applied. On the following day her countenance was flushed and anxious, respiration difficult, and accompanied by a hoarse sound, voice scarcely audible, deglutition impossible, pulse developed, and skin hot.

A few hours after, on examining the throat, a whitish false membrane was observed on the anterior part of the velum palati, and on this being raised, the mucous membrane beneath was bloody; the other symptoms were in no respect relieved.

On the following morning the patient was dying, the respiration shorter and more sonorous, and death occurred soon after the visit.

Dissection.—A very thick false membrane covered both surfaces of the velum palati, extended into the nasal fossæ, and penetrated into the larynx, trachea, and bronchi; it adhered more strongly to the larynx than to the trachea.

CASE XIII.

Early in May, 1847, Mrs. B., of Forsyth street, about 23 years of age, was attacked with measles. She was healthy and robust, before contracting the disease, and was seven months pregnant at the time of her attack.

Nothing unusual occurred during the progress of the measles, until toward the close of the eruptive fever, when Mrs. B. was seized with pain and inflammation of the throat, attended with swelling of the tonsils and fauces generally, and with dyspnœa and great difficulty of deglutition. Her attending physician, Dr. Belcher (Sen.), was immediately called, and finding the above symptoms present, employed both general and local bleeding, and such other antiphlogistic measures as were deemed advisable. But the disease continuing to advance, another physician, Dr. M., of this city, was called in consultation, and other measures were adopted, but without arresting in any degree the progress of the disease.

On the 18th of May, one week after the attack of the diphtheritic inflammation, I was requested to see this patient, in consultation with the attending physician.

The following was the condition in which I found her at this period: She was supported in an upright position in her bed, with her head

thrown back and breathing with the greatest difficulty ; the lips and face were livid, the countenance anxious ; the pulse small and frequent, and the extremities cold ; there was a hoarse, croupal cough, with great difficulty of swallowing, and an entire suppression of the voice. On inspecting the throat, the fauces, tonsils, and the uvula, and indeed every part that could be brought into view, were found to be completely coated with a dense false membrane. By depressing the tongue, nearly the whole of the epiglottis was exposed, and that cartilage, as well as the pharynx low down, could be seen covered with the same adventitious deposit, leaving no doubt from the condition of the voice and the circulation, that the exudative inflammation had not only entered the larynx and trachea, but had reached even the bronchial terminations.

At the consultation it was agreed that as all other means had failed, an attempt should be made to relieve the larynx by topical applications of the nitrate of silver to the diseased mucous surface, and I was requested to make these applications.

Employing a solution of the strength of forty-five grains of the salt to the ounce of water, I applied it freely to the whole faucial region, and also passed the sponge, wet with the solution, into the larynx. The patient manifested

no uneasiness whatever from the application, and, on being questioned, declared she did not feel it in the least degree. The strength of the solution was now increased up to sixty grains to the ounce of water, and a second and third cauterization was made deep into the cavity of the larynx, all in the space of fifteen or twenty minutes.

It was not until the last application that the patient complained of any irritation having been produced by the caustic solution. Many shreds of the false membrane were brought away by the sponge, and were also ejected by the cough and expectoration that followed the last two applications. So decided was the relief obtained by these operations that the patient begged to have them repeated before we left the house.

A supporting plan of treatment was advised for the patient, and it was agreed to return at six o'clock and repeat the applications.

At the above hour in the afternoon, we found the patient exhibiting symptoms more aggravated than those which were present in the morning; the lips and countenance were of a livid aspect, the respiration was more stridulous, and the breathing was being performed with still greater difficulty. The relief that followed the first applications had continued for several hours, but for some time before our return in the evening,

the above symptoms had been coming on with constantly increasing violence.

At this visit, the applications of the sponge, wet with the solution of sixty grains to the ounce of water, were made into the larynx at intervals of five minutes, care being taken at each application to convey below the epiglottis as much of the fluid as the sponge could contain. A large quantity of muco-purulent matter, containing many particles of the false membrane, was ejected by coughing after each cauterization.

Soon after these operations, the patient expressed herself greatly relieved, and we left her, with her respiration much less embarrassed than it was on our arrival; and the following night was passed by the patient with less distress, restlessness, and oppressed breathing, than had been present during either of the two preceding nights.

May 19th. There is still great prostration, anxiety, and stridulous respiration present. The countenance is yet livid, the cough is croupal, and the voice is reduced to a feeble whisper. But it is concluded, notwithstanding, that our patient has lost nothing, on the whole, during the last twenty-four hours. Some patches of albuminous secretion can be seen about the tonsils, the uvula, and the epiglottis; but it has been detached and removed from many parts of

the throat, leaving the mucous membrane beneath thickened and inflamed.

A solution of four scruples of the nitrate of silver to the ounce of water was made, and three cauterizations of this strength were employed during the day. The effect of each application was to produce a free expectoration of albuminous matter, which was sure to be followed with great relief for a longer or shorter period.

May 20th. But little change occurred in our patient throughout yesterday and last night. Four cauterizations were employed during the day and night, which caused the ejection of much adhesive mucus, with membranous fragments. Some rest was obtained, but great restlessness, feeble pulse, cold extremities, and oppressed respiration, were present during the greater part of the night.

On examining the patient's throat to-day, it was found that the coriaceous deposit was almost entirely removed from the tonsils, uvula, and epiglottis, yet the embarrassed and sibilous respiration, the great anxiety, and the livid countenance of the patient, plainly indicated that the false membranes were still obstructing the air-passages below, and were thus preventing the perfect arterialization of the blood; it was therefore determined to carry the cauterizations deeper into the trachea than had yet been done.

In the presence of Dr. Belcher, the attending physician, and my friend Dr. S. Conant Foster, who had accompanied me to see the case, I passed a sponge, saturated with a strong solution of the nitrate of silver—eighty grains to the ounce—through the rima glottidis, and along the whole length of the trachea. The withdrawal of the probang was followed by a severe fit of coughing, and the expectoration of a great quantity of muco-purulent and membranaceous matters.

Soon after this last operation, the patient appeared greatly relieved, and breathed with more freedom than she had done at any time since her first attack. The same application was repeated at evening, and from this time her recovery was rapid. The cauterizations were continued every day for nearly a week longer, when the consultations were discontinued, as the patient was considered out of danger.

Mrs. B—— recovered perfectly, and was delivered of a healthy child at her full term; but vocalization did not return until many weeks after her restoration to health. It has since been fully restored.

I am quite sensible that, in the treatment of croup, the removal of the false membrane simply is not, after all, the only indication of im-

portance ; for, it has been shown repeatedly, from the dissections of those who have died of the disease, that death has not occurred as the result altogether of the obstruction presented by the adventitious membrane, inasmuch as it has been found in many such cases, that within the membrane a space was left for a current of air, sufficient to support life. But, the same exudative process which results in the spreading of a false membrane over the mucous surface of the larynx and trachea, will, if allowed to progress, inflame the whole bronchial divisions, and block up and distend the ramifications of the bronchi and the lungs with serum and puriform matter ; and in this way will effectually prevent the arterialization of the blood. To arrest, therefore, this morbid condition of the mucous membrane, which causes the generation of these albuminous exudations, is an indication of the highest importance. Now, from the well-known therapeutic effects of the nitrate of silver upon inflamed mucous tissues, and from my own experience in its use, which is not a limited one, I can with confidence recommend it as the most efficient and certain of all topical agents for effecting this very purpose. So salutary, indeed, have I been led, in my experience, to consider the effects of the nitrate of silver when topically applied to the mucous membrane, and its cryptæ,

in plastic inflammation, that for several years I have not hesitated to employ it, in combination with appropriate general remedies in all stages of both simple and complicated membranous croup.

Since the publication of the first edition of this work, I have watched with much interest the results of the "received mode of treating croup," as this method is generally employed in the management of the disease, in this and other cities.

The extent of the fatal cases of croup which have occurred among children in the city of New York, during the last few years, is almost without a parallel in the history of this or any other disease of childhood. This holds true with regard to those seasons in which no epidemic influence has prevailed. The number of deaths from croup in this city during the year 1858—a year that has been unusually temperate—amounted to four hundred and seventy-eight. But in 1854, from a statement published by the City Inspector, it appears that during that year, which ended February 28th, 1854, the number of fatal cases of the disease that occurred in New York, was *six hundred and eighty!* The subjoined table contains a statement of the number of deaths from croup, in each of the months of the

above-mentioned year ; and, also, columns to exhibit the relative proportion of males and females out of the six hundred and eighty fatal cases.

	Males.	Females.	Total		Males.	Females.	Total.
1858 March.....	34	36	70	1858. October.....	38	43	81
" April.....	29	26	55	" Nov.....	31	39	70
" May.....	27	22	49	" Dec.....	47	42	89
" June.....	28	14	42	1854. Jan.....	28	39	67
" July.....	18	15	33	" Feb.....	33	28	61
" Aug.....	21	11	32				
" Sept.....	15	21	36		344	386	680

We have no means of comparing the preceding statement of the fatal cases of croup, with the statistics of deaths from this disease in other places during the same time ; but, on referring to an article published in the *London Medical Gazette*, for 1850,* on the subject of croup, we find that, in a population nearly fourfold greater than that of this city,† the average number of deaths from croup, during a period of eight years, in London, was less than three hundred and eighty a year. The number of deaths from croup in the whole State of Massachusetts, in 1851, according to the Registration Report for that year, in a population, at that time, of about one million,‡ amounted to four hundred and eleven. During the same year, in Suffolk County (which county includes

* *London Medical Gazette*, vol. x. p. 542.

† The number of the inhabitants of London, at the last census, was 2,362,236. In New York, in 1850, it was 515,547.

‡ At the census in 1850, the population of Massachusetts was 994,514. That of Boston proper, 136,881.

Boston, Chelsea, etc.), with a population amounting to 145,000, the deaths were ninety-two.

It will be recollected, that at the census of 1850, the population of Kentucky was very near the same in amount with that of Massachusetts.*

It is a little remarkable, diverse as are the climates of these States, that, with a population nearly equal, the number of fatal cases of croup should be so uniform. In 1852, according to the Annual Report of the Registration of Births, Marriages, and Deaths, in Kentucky, for the above year, the deaths from croup were four hundred and sixty-one ; just fifty more than occurred in Massachusetts during 1851.

In Philadelphia, the mortality from croup, in the five years preceding 1846, was seven hundred and fifty-six ; or an average of one hundred and fifty-one a year, † in a population which, at the census in 1850, amounted to 121,376.

These brief statistics will afford us some idea of the ordinary annual mortality from croup in some of the larger cities, and in different climates, and will exhibit, also, especially in comparison with London, the frightful mortality caused by the disease in New York during the year named.

It is now over fifty years since Napoleon's offered prize for the best essay on the nature of

* The population of Kentucky was 985,405.

† Dr. Meigs on the Diseases of Children, p. 84.

this disease, served to awaken a new interest on the subject throughout the whole of Europe ; and was the occasion of eliciting many learned, elaborate, and highly interesting works on the nature and treatment of this terrible malady. From that time to the present, these inquiries have been pursued, in this country and in Europe, by eminent medical men, and the results published to the world ; but, has a plan of treatment yet been discovered, recommended, and adopted generally, that has had the effect to abate the severity of the disease, or, in any considerable degree, to lessen its fatality ?

In that excellent treatise on Croup to which I have alluded, by Dr. Ware, the author declares, that “ the received mode of treating the disease,” which is very much the same for all varieties, “ has come down to us by a sort of tradition from our predecessors in the profession, and varies but little, if at all, from that which was originally adopted when the disease first became the object of attention. . . . In the main, emetics and bleeding, blisters and calomel, have been the principal remedies. The depleting, reducing, and perturbing method is that upon which dependence has been chiefly placed.” *

This is, indeed, true, for it must be admitted that whilst in the management of many other

* Boston Medical and Surgical Journal, vol. xiii., p. 261.

diseases great improvements have been made during the last half century, in the traditionary treatment of this affection no modifications have been generally adopted which have served to diminish, in any amount, the number of fatal cases. On the contrary, the disease is admitted, as I have before stated, to be so far uncontrolled by the ordinary therapeutic measures, as to prove fatal in nearly one half of the whole number of those who are the subjects of this affection.

These unfortunate results, which, in the statistical records of croup, have followed the ordinary mode of treatment, will be found to have been in no degree more favorable in the history of the disease as it has occurred in our city and county during the past few years, and we do not hesitate to avow our firm conviction, that the employment of the reducing and perturbing plan of treatment, a plan recently recommended by more than one eminent writer, and still employed by many practitioners, has destroyed more lives, among young children, altogether, than it has been instrumental in saving. A work, by an eminent English writer, has recently been republished in this country, which has met with a very favorable reception from the profession generally, and has received the commendation of the reviewers, in our medical journals; and yet, the method urged by the author, in his "Lectures on

the Diseases of Infancy and Childhood,"* as the appropriate plan for the management of membranous croup, if fully carried out in the treatment of the disease, would prove fatal in its results, as we conscientiously believe it has done, in more instances than it has proved remedial. That we may not be misunderstood in our remarks on this heroic plan of treatment recommended by Dr. West, and employed, to a great extent, by many practitioners in this country, we shall take the liberty of giving a brief statement of the therapeutic measures by him adopted.

In cases where an attack of croup "is merely apprehended, but where catarrh exists, attended with a slight, ringing cough," Dr. West recommends that the child "be confined to the bedroom, be placed on a spare diet, and should take an emetic of ipecacuanha and antimony, to be followed by some mild diaphoretic medicine containing small doses of antimonial wine."†

But, should the disease have attained its full development, before the patient comes under the notice of the physician; or, should its access be violent, a far more energetic plan of treatment is advised by Dr. West. "The abstraction of blood,

* Treatise on the Diseases of Infancy and Childhood, by Charles West, M.D.

† Diseases of Infancy and Childhood, by Charles West, M.D., p. 221, Philadelphia edition.

and the administration of tartar emetic, are the two measures on which your main reliance must be placed ; and you must bleed largely, and give tartar emetic freely, remembering that if relief do not come soon it will not come at all—that there is not danger only, but death in delay. I have never met with an exception to the rule which prescribed the free abstraction of blood in every case of severe idiopathic croup, when seen at an early period, and before the purple lips, and livid countenance, and failing pulse, announce the long continuance of a serious obstacle to the free admission of air into the lungs. Even in very young children, local depletion forms, in these cases, but a poor substitute for general bleeding ; for it is not merely the abstraction of a certain quantity of blood that is needed, but its removal in such a manner as most speedily to produce an effect on the system. Bleeding from the jugular vein is preferable, under these circumstances, to venesection in the arm, since the latter often fails in children under three years old ; and the blood never flows so freely as when taken from the jugular vein.”*

After bleeding “largely” from the arm—or, what Dr. West considers preferable, “in very young children,” from the jugular vein, *because*, in children under three years of age, “the blood

* Ut supra, p. 221.

flows more freely when taken from the jugular vein"—the free administration of tartar emetic is recommended. To accomplish any real good by means of this medicine, "it must be given," says Dr. West, "in doses of an eighth, a quarter, or half a grain, every ten minutes, until vomiting is produced; and the same doses should afterward be continued every half hour, until decided and permanent relief has been afforded." If the medicine, when administered in the amount as at first, fails after a little to excite vomiting, it is advised by the author to increase the dose until this effect is fully produced. The antimony thus administered, is to be continued for four or six hours, when, if "no satisfactory measure of improvement should have yet appeared, local depletion may be resorted to, or possibly a repetition of general bleeding may in some cases be ventured on." *

Later in the disease, calomel in combination with ipecacuanha, is administered every hour or two hours, "but interrupting its use at intervals in order to give an antimonial emetic;" and, finally, these active therapeutical measures above enumerated having been thoroughly tried, and tried in vain, Dr. West advises that a totally different plan of treatment be at once adopted. "If antimony cease to vomit," he remarks, "or

* Op. citat. p. 222.

if it be rejected immediately, and without effort, the fluid thrown up being unmixed with phlegm or false membrane, while the temperature sinks, the lips grow more livid, the pulse more frequent and feeble and the paroxysms of dyspnœa are undiminished in severity ; or, if the respiration, though less laborious, be attended with a sibilant, instead of a stridulous sound, it is evident that by continuing the medicine we may destroy the patient, but shall fail to cure the disease."

Under such circumstances, "an attempt must be made to arouse the child from the state of collapse into which it is sinking, by placing it for a few minutes in a hot mustard bath, and emetics of the sulphate of copper should at once be administered."* If to the therapeutic measures already enumerated, we add that of the use of mercury, which, in addition to its occasional administration at an earlier period, is to be employed at that stage of the disease when the patient "seems sinking into a state of collapse," and under these circumstances to be fully employed, by means of its internal administration, every hour, "while at the same time a drachm of strong mercurial ointment may be rubbed into the thighs every two hours," in order to bring the system as speedily as possible under the influence of mercury," together with the applica-

* *Op. citat.* p. 224.

tion of "a blister to the throat"—if these measures are included, we repeat, they constitute the plan of treatment strongly advocated by Dr. West, and employed by many practitioners, both in Europe and in this country, for the cure of membranous croup. "Emetics and bleeding, calomel and blisters," *Medicina agens et perturbans*, the Sangrado, traditionary treatment of the last half-century! We can hardly imagine a plan more likely to prove unsuccessful, when fully carried out, than the method of which we have spoken; and if we consult the records of this plan, we shall find that, where it has been adopted, this opinion of its effects will be entirely sustained by the results which have followed its employment.

A similar method, though in some degree less heroic, is advocated by Dr. Meigs, of Philadelphia, in his work on "The Diseases of Children."* In a "summary of the treatment," Dr. Meigs suggests "the following plan of treatment to be pursued in children about or over two years old, when we are called in good time: to take from the arm three or four ounces of blood, once, twice or three times in two days, according to the strength of the child, and the degree and obstinacy of the fever. In both forms of the disease, emetics, and

* A Practical Treatise on the Diseases of Children. By J. Forsyth Meigs, M.D., etc. Second edition.

I would recommend alum in preference to any other, should be given once at least, very often twice, and, in violent cases, three or four times in the twenty-four hours, so as to produce vomiting attended with a good deal of effort. To give, at the same time, from one to two grains of calomel, with a quarter or half a grain of Dover's powder, every two hours, taking care not to give a dose for an hour before nor after the time selected for the exhibition of the emetic. In cases in which there is loud stridulous respiration, heard both in the inspiration and expiration, in which previous treatment has had no effect, and in which there is threatening of speedy death, we may give two grains of calomel every hour, until three or four doses have been taken, and direct the exhibition of an alum emetic after the last dose, or resort to tracheotomy."*

Certainly, in one respect, this "plan of treatment" is characterized by a great improvement on the wholly reducing and prostrating method ordinarily adopted ; namely, in substituting alum for antimony as the emetic in the treatment of the disease. His reasons for this are as follows : " Antimony, when resorted to as frequently in the disease as I am of the opinion emetics ought to be, is too violent in its action ; it prostrates many children to a dangerous degree, and is,

* Op. citat. p. 103.

I fear, in some cases, itself one cause of death."*

If, then, these positions, with regard to the generally-adopted reducing plan of treating croup are tenable—and in confirmation of these views we challenge inquiry into its history—is it not time for the thinking, *progressive* portion of the profession to conclude with Dr. Ware, "that the methods of treating this disease in common use, require a careful reconsideration?"

CHAPTER VII.

EXPERIENCE OF EMINENT MEDICAL MEN IN THE USE OF TOPICAL MEDICATION, AND THEIR OPINIONS OF ITS VALUE IN THE TREATMENT OF DISEASE.

As a difference of opinion still obtains, to some extent, among the profession, with regard to the propriety of employing topical applications of the nitrate of silver in *exudative laryngitis* or croup, I shall examine, with care, the opinions and observations of some of those practitioners who have had extensive opportunities, both in this country and in Europe, to test its efficacy in the treatment of this often fatal malady.

Since the publication of this work, the author has received from medical men, in different parts of the United States, as well as from numbers in Europe, the history of many cases of membranous croup, wherein topical measures, in their hands, have proved effectual in arresting the disease. In view of the great fatality, on the one hand, which constantly attends this disease, as ordinarily treated, and on the other, of the prejudice against the local treatment, which is still entertained by many, especially of the older

members of the profession, the author does not feel at liberty to withhold from his professional brethren this abundant and most conclusive testimony in favor of topical medication in the treatment of croup.

It will not avail, for the cavilling opposer of this method of treating the disease, to rebut all testimony in its favor, as many in the profession, who, having always refused to try the plan, have persisted in doing,* with the assertion, that the cases of croup which have recovered rapidly under local treatment "were not cases of true membranous croup, but those of a spasmodic or catarrhal nature, such as would have recovered under almost any treatment;" for, in many instances, the employment of nitrate of silver, in the treatment of croup, has been adopted with great success, by eminent practitioners, who previously had had extensive experience in the management of the disease, but who, before the em-

* In a case of membranous croup that occurred in this city, the history of which was received from the attending physician, a prominent surgeon was called, by request of the family, in consultation. The case had advanced, until the symptoms were very urgent, and prompt measures were demanded, to save the life of the child. The physician in attendance proposed cauterization of the parts, rather than tracheotomy. The consulting surgeon positively refused to accede to the adoption of this plan, on the ground that it was a dangerous, and, in such cases, a worthless measure. The physician, however, persisted in his proposal, and the surgeon retired. Cauterization of the larynx was then promptly and perseveringly employed, and, by this means, the life of the child was saved.

ployment of topical medication, had treated, unsuccessfully, a large number of cases by the ordinary "depressing, depleting, and disturbing remedies." This was the case, as with many others to whom we could refer, with Dr. Ware, to whose experience, in the different modes of treating this disease, and the conclusions to which he has arrived, we shall now briefly allude.

Dr. Ware, in his papers on the "History and Diagnosis of Croup," refers to thirty-nine cases of what he denominates membranous croup, which were noticed in his own, or in the practice of his friends. Of these cases the state of the fauces was observed in thirty-three instances, and "in thirty-two a false membrane was present; most frequently, and sometimes only on the tonsils, sometimes on other parts also, as the palate, uvula, and pharynx. In one case no such membrane was present; but it was found to exist in the larynx after death. These thirty-three cases were treated by the ordinary therapeutic measures; and of the whole number, *three* only recovered—in thirty, the disease proved fatal." It is not at all surprising that, under these circumstances, Dr. Ware, eminent for his careful investigation and conscientious inquiry after truth, should have become "confirmed in the opinion," as he subsequently declares himself to

have been, that the methods of treating this disease, in common use, require a careful reconsideration ;” nor that he should have propounded the question—“ If the mode of treating croup commonly adopted, does no good, are we sure that it does no hurt ?”

Having concluded, after the experience to which we have referred, to treat the disease “without the persevering use of the heroic remedies,” Dr. Ware subsequently adopted a method in which “the treatment consisted—

“ 1. In the absence of all reducing, depleting, and disturbing remedies.

“ 2. Keeping the patient under the full influence of opium combined with calomel.

“ 3. Constant external application of warmth and moisture [to the neck], and of mercurial liniment, slightly stimulating.

“ 4. Constant inhalation of watery vapor.”

In March, 1850, Dr. Ware read before the Suffolk District Medical Society, “Additional Remarks on the Treatment of Croup,” in which paper he refers to five cases of membranous croup, three of which were treated on the method indicated in the preceding propositions. The history of these five cases, as briefly narrated by Dr. Ware, with the conclusions to which he has arrived, we shall take the liberty of giving in his own words :

“The first case was that of a male, four years old, who was taken with membranous sore throat, accompanied by high constitutional irritation, Oct. 14, 1845. No croupy symptoms occurred till Oct. 18, when they were manifested in a perfectly distinct manner. On the 20th and 21st, patches of false membrane, with bloody sputa, were raised—and one piece of four inches in length. The raising of the latter was accompanied by a severe and suffocative paroxysm of coughing. On the 22d he died, eight days from the commencement of the disease and four from the access of croup. The suffering in this case was very considerable, but far less than I have been accustomed to witness in cases of croup treated according to the ordinary method.

“The second was that of a female, four years of age, taken with croup on the 8th of Nov., 1845. No depleting or reducing remedies were employed. Patches of membrane, and one piece of considerable size, were brought up on the 10th, and a few following days. She never suffered much, improved steadily, and on the 15th seemed well in all respects except the voice, so that on the 16th I did not see her. On the 17th, there was a return of all the croupy symptoms, including the appearance of lymph upon the tonsils, and she died on the night of the 19th, eleven days after her first seizure. During no part of

the disease was the suffering from dyspnoea very intense for any continued period.

“On dissection, the usual appearances were found, and in one lung the false membrane extended for some distance into the bronchi in the substance of the organ.

“The third case was a female, six years of age, who was seized with the disease Oct. 31, 1847. The onset of the disease was gradual, yet quite distinct. Nov. 2d, the symptoms had become quite severe; and Nov. 3d, there was bloody expectoration, and pieces of membrane were spit up. Pieces of membrane continued to be found in the sputa for several days, and she was very comfortable and breathed with tolerable ease, yet never losing the distinct croupy sound of respiration and voice. She retained some appetite and sat up and amused herself as usual. On the 8th, she became rapidly worse, but without distress, and died on the 9th, quite easily ten days from the first attack of the disease.

“It will be admitted, I think, that these cases, especially the two last, exhibited certain differences from the common course of this disease, which indicated a favorable influence from difference of treatment.

“In all of them the membrane was thrown up in considerable quantities.

“In all of them the disease was attended by

very much less distress than is usual in croup, and, in two, there was so decided a mitigation of symptoms following the separation of the membrane, as to lead to considerable hope of a favorable termination.

"In two, at least, the disease was prolonged to twice its average duration under the usual treatment.

"In the two other cases, to which reference was made, the same general course of treatment was followed, with the addition of the introduction of a sponge, wet with a solution of the nitrate of silver, into the larynx. In each of these cases the application was made as early in the disease as I became satisfied of its distinct character. It was repeated morning and evening. It decidedly gave relief to the breathing, soon after each application, and both cases ultimately recovered perfectly. For the suggestion and adoption of this valuable addition to our means of treating this formidable disease, we are indebted, as is well known, to the enterprise of Dr. Horace Green, of New York. The profession, I think, owe to him a large debt of gratitude, for the energy and perseverance manifested in the introduction of this remedy, and I am the more disposed to render this tribute to him, because so many attempts have been made to detract from his merit in relation to it."



"I am well satisfied from what I have now seen of this method of treating croup, as compared with that which has been followed for so many years, that it has the advantages which were pointed out in one of the preceding papers. It is a disease which I would treat without depletion—except, perhaps, by a few leeches—without vomiting, without purging, without blisters, without antimonials, ipecac., and all those other nauseous remedies which have been usually resorted to. I would trust to opiates, perhaps calomel, emollients, and the local application of the nitrate of silver.

"I ought to add that many of my friends in the profession have informed me of cases in their practice, treated on these principles, which have recovered in a favorable manner."

Since the publication of Dr. Ware's papers, cauterization of the larynx, in the treatment of membranous croup, has been adopted by large numbers of medical men in New England, from many of whom we have received communications on this subject, expressing their full confidence in this therapeutic agent, when timely and appropriately employed in the management of croup.

Should we give the history of a tithe of these cases, which have been thus reported to us, they would occupy a much larger space than can be appropriated to this subject. In many instances

—and this is the testimony of large numbers of practitioners, experienced in the disease—the morbid process has been promptly arrested, by topical medication to the surface of the tonsils and pharynx without the introduction of the sponge-probang into the larynx.

Some time ago, a physician from the interior of one of our southwestern States, called on us to state his experience in the treatment of croup by local measures. Two or three years before, he had passed several weeks in our city, and had then seen, for the first time, the employment of topical medication for the treatment of laryngeal and bronchial diseases. Returning to his home in the West—a region noted for the frequency with which croup occurs among children—he commenced at once to put into practice the new method of treating disease, with which he had recently become acquainted. During his previous practice, he had treated many cases of croup in the ordinary method, and the proportion of deaths, in his experience, as he stated, had been quite equal to one-third of the whole number attacked. But since the adoption of topical medication, during the two or three years after his return, some fifteen cases, he affirmed, had come under his observation, and were treated by cauterization of the fauces and larynx, *every one of which recovered*. The plan adopted by this physi-

cian was the same as that which is recommended in this work.

As before asserted, since the publication of this work on croup, we have received similar verbal statements, in favor of topical medication, from physicians resident in almost every State in the Union ; but we have also abundant *written* testimony on the subject.

The following cases from Prof. May, of Washington, who is one of the most distinguished of American surgeons, will be read with much interest :

WASHINGTON, April 30th.

“ MY DEAR SIR :

“ I herewith inclose you a hasty and brief account of the cases of cynanche trachealis, in which I have used the strong solution of nitrate of silver, as recommended by you in your work on croup. The statement of these cases is not as full and satisfactory as I could have desired, owing to the partial notes hastily taken by me at the time of their occurrence ; but the result, in several of them, fully sustains the great value of the local agent recommended by you, to arrest this formidable disease, and which you have been, I believe, the first to bring fully to the consideration of the profession,

“ I am very truly and respectfully yours,

“ JNO. FRED'K MAY.

" *Case 1.* On the 2d of January I was called on to visit a son of Mr. C., of this city, aged about ten years, whom I found laboring under symptoms of croup. The child had been complaining of some uneasiness about the throat, with hoarseness and slight cough, a day or two before I saw him. At my visit, his respiration was difficult, and there was a good deal of tenderness about the tonsils and fauces, which were inflamed. There was considerable febrile action, and the little patient was very restless, and the voice quite hoarse. I directed an emetic, to be followed by an active mercurial cathartic, his bowels being constipated, and such local applications, both internal and external, as I thought most likely to give relief.

" At my visit next day, I found my little patient no better, but, on the contrary, his symptoms were more unfavorable and alarming. His respiration was very difficult, and his countenance expressed great suffering and anxiety. He could not remain more than a few moments in a horizontal position, but was raising himself up continually, and stretching backward the head to obtain relief. In a word, the difficulty of respiration was extreme. He was very hoarse, his pulse very hurried, and the throat and tonsils more inflamed than at my previous visit. The symptoms of diphtheritic croup, which had been epi-

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demic in our city the year previous, were very decided. I at once resolved to try your method of introducing a strong solution of argent. nitrat. into the larynx—everything else having been tried by me, in this disease, the year previous, not excepting tracheotomy, with but little success. The symptoms were very urgent. I felt satisfied that, unless soon relieved, the case would probably end fatally. I had no instrument sufficiently small for the object I had in view, and I therefore bent a small piece of ash stick to the proper curvature, and secured to the end of it a small piece of sponge, which I saturated thoroughly with a solution of the crystallized nitrate, of the strength of forty grains to the ounce, and introduced it fairly into the larynx. This I repeated once or twice, on the spot, the child being forcibly held by the father. There was considerable irritation produced in the throat, for a few moments, but I believe it was caused as much by the effort, on the part of the child, to resist, as by the action of the caustic.

“ I remained some time after using this remedy, and in half an hour the improvement in his breathing was manifest to all present. I left him breathing decidedly better, and when I returned in the morning I found the child had passed a quiet and comfortable night, having slept a considerable portion of it. The caustic

solution was again used by me, in the same way, at this visit, his breathing having again become somewhat more difficult, and with the same improvement in his condition. My visits to him were soon after discontinued, the little patient having entirely recovered.

"*Case 2.* I was requested in May, by my friend, Dr. Dawes, to visit, in consultation with him, in the country, a little girl of two years of age, the daughter of R. S. Wood, Esq.

"Dr. D. had been in attendance on the child for several days, and had administered the usual remedies in her disease, which was membranous croup. Having mentioned to him, some time before, the success of the argent. nitrat. solution, in the case which I have already stated, he was desirous of having it used in the present instance.

"When I saw the child the breathing was extremely difficult, and the cough tight and ringing. The little patient was much exhausted, having slept but little during the twenty-four hours which had passed. It was constantly held by the mother in her lap, or by some of her friends, as the respiration became more labored when she was placed in the bed. I at once used the solution of crystallized nitrate of silver, introducing it into the larynx, and cauterizing also the back part of the throat, freely. The solu-

tion was of the strength of fifty grains to the ounce.

“The respiration became easier before I left the house. This was apparent to all, and at the same time the pulse improved, and the skin became more natural and warm. On our return, early in the morning, we found the little patient had passed a much more comfortable night, and her breathing had decidedly improved. The caustic was, however, again used, and with an equally satisfactory result. The symptoms of the disease gradually yielded, and the child recovered. As I was not aware, or had forgotten the treatment which had been pursued in the commencement of her case, I applied to Mr. Wood, who had formerly pursued the study of medicine, for a statement of it. I received the following reply:

“‘My daughter, about two years old, was attacked with croup in the month of May last. She had never suffered previously from any disease, and her constitution was good. After trying the usual domestic remedies, such as hot baths, emetics, local applications, and small doses of calomel and ipecac. frequently repeated, we were induced to send for our family physician, Dr. Dawes, who prescribed mercury to the full extent warranted by her critical situation. On the third day, the doctor proposed consulting

with you, in regard to the propriety of introducing a strong solution of the nitrate of silver into the larynx. I readily gave my consent, and the operation was performed twice within twelve hours. The character of the respiration was perceptibly changed on the first trial, but we felt doubly sure of success on its repetition; the pulse rallied, and the color of the skin became more natural.

“ ‘She is now enjoying perfect health.’ ”

Other cases have been treated by Dr. May with equal success, the history of which have been furnished by him; but, as our object has been to give the testimony of different members of the profession, from various localities, these may with propriety be omitted.

Dr. A. M. Vedder, Lecturer on Anatomy and Physiology, at Union College, has treated many cases of membranous croup by topical measures. The subjoined cases were communicated by Dr. Vedder.

Even at the present day, there are medical men who will not admit that the passage of an armed probang into the larynx of the adult can be accomplished. Much more emphatically do these men deny the possibility of cauterizing the larynx of the young child. Within the last year, an astute professor in one of our medical colleges

declared, before his class, his firm belief that the operation had not been, and never could be, performed! To such "blind guides," we would commend the interesting fact recorded in the second case reported by Dr. Vedder.

"*Case 1.* A little girl, aged six years, was under treatment by a neighboring practitioner, who called me in consultation. She was first taken with what we supposed to be slight catarrhal symptoms; after a few days, the cough became stridulous, and was accompanied with some fever. These symptoms continued for three weeks, gradually increasing in severity. At this time I saw her, in the evening, and found her laboring under the characteristic symptoms of inflammatory croup; pulse rapid, and small; voice reduced to a whisper; respiration high and labored; tonsils red and inflamed, but not covered with false membrane. The attending physician had treated her with sinapisms, calomel, and tartar emetic, the latter in emetic and nauseating doses.

"I suggested the topical application of nitrate of silver, which was readily acceded to. Two applications were made (ʒ ii. to ʒ j. aqua). The probang was found covered with a thick, tenacious secretion. Respiration became somewhat more free. On the following day, there was a marked increase of all the symptoms, the silver

was again applied three or four times during the day, entering the glottis each time. There was now a gradual improvement of all the symptoms, and no further applications were made. During this time, calomel and James' powder were also administered.

" *Case 2.* Louisa —, aged six years, general health previously good, came home from school (Nov. 1st) complaining of sore throat and cough, which was followed by vomiting. A homœopathic doctor was sent for, who treated the case as 'sore throat' for five days; during this time, she was not wholly confined to the bed, and was about the house a part of the time. On the afternoon of the fourth day, she became very hoarse, with loss of voice and decided croupy cough. Nov. 6th, confined to bed, with considerable heat of skin and thirst. I saw the patient this day, for the first time, at 6 o'clock, P.M. Expression of countenance anxious, skin pale, voice reduced to a whisper, respiration extremely difficult, high and characteristic, pulse frequent, skin above natural temperature, cough frequent; applied the nitrate of silver with the probang, which did not produce any unpleasant symptoms, her breathing became somewhat easier; during the night her respiration became more difficult, and an emetic was administered, which was followed by some relief. Nov. 7th, A.M., countenance still anxious, color of

skin inclining to blue, respiration not much improved, almost complete aphonia ; prescribed the following powder, to be taken every three hours.

“R. Tart. Antim., gr. $\frac{1}{8}$,
Hyd. Chlor., M. gr. $\frac{1}{4}$.
M.

“Applied the silver three times during the day. Nov. 8th, no improvement ; sweats now freely, and has done so all night ; on coughing expectorates a little mucus, particularly after applying the sponge ; continue powders and apply cold water to the neck by means of a towel. Nov. 9th, no improvement ; applied the sponge, and on removing it *the false membrane* was found attached to the sponge ; and on examination found it to be a membranous tube two and a half inches in length, and about one half the thickness of milliner’s pasteboard. Her respiration became immediately easier and she continued to improve ; from this time the sponge was not again applied ; her cough remained ‘croupy’ for several days longer ; her voice did not become natural for more than a week after ; the cold water and expectorants were continued for several days. Her health has been good since ; her voice becomes hoarse, occasionally, on taking cold. I should have remarked, that at my first visit, I saw patches of lymph on the tonsillary glands. On taking charge

of the patient (which I did with great reluctance), I had very little hope of a favorable termination, on account of the advanced stage of the disease, and must attribute the cure to the application of the silver.

“Since treating this case I have used the silver with varying success. In two cases, in which I was called early, and in which the lymph could be seen in the upper part of the fauces, the patients recovered. In one case where I was called in consultation, the patient was *in articulo mortis*. We used the silver without any relief. In two other cases, I was called late in the disease; the nitrate of silver, and other remedies were employed; but both cases terminated fatally.”

Believing, as we conscientiously do, that the reducing, perturbing, plan of treating young children for croup, is in a large proportion of cases, not only useless, but worse than useless; and that, on the other hand, we have, in the topical treatment, when judiciously combined with mild general measures, an entirely practicable, and in most cases, an effectual means of arresting the disease, we are solicitous to remove the objections, which, for various reasons, exist in the minds of many practitioners, and hinder their adoption of this method. We have alluded to the

dogmatic skepticism of one class, but fortunately this class of "unbelievers in the earth's rotation," is very small. Still, there is a much larger class, who, whilst they admit both the practicability and utility of the treatment, reject its employment because of the supposed difficulty of medicating the larynx in disease. This difficulty, we can assure the profession, does not exist. It is neither really difficult to accomplish, nor is it in any degree a hazardous operation. Any medical man who understands the relative anatomy of the parts, can, with very little practice, readily pass the sponge probang into the larynx ; and, as benefit comes from the attempt (for the parts cauterized thereby are those first affected in croup), no time should be lost in putting the method into practice, in the onset of the disease.

Dr. E. R. Peaslee, judicious and experienced, as a medical practitioner, in the monograph on croup, to which I have referred, says : "In our judgment there is no local application for arresting the inflammatory process in this disease to be compared with the solution of the crystals of nitrate of silver. It should be at first applied to the fauces and pharynx only ; and then, in 15 to 30 minutes, the probang may be passed into the larynx, and through the rima glottidis if required. The operation should be repeated, in some cases, three or four times daily, in

others only once. Other solutions or fluids, thus applied, may also be found useful—such as glycerine, olive oil, etc. ; but none will probably be found to possess the efficacy of the nitrate of silver. Applied to the pharynx and fauces, indeed, as soon as the false membrane has appeared in these parts, it has frequently arrested the inflammatory process at once, and thus prevented its extension into the larynx and trachea.

“ We should, therefore, feel it an unpardonable omission, at the present day, should we fail early to cauterize the pharynx (and the larynx and trachea, if already invaded by the disease), and to repeat the operation as circumstances might require in every case of laryngo-tracheitis. The objections sometimes raised, that this is a difficult operation, and also, if accomplished, a dangerous one, were always too puerile, and are now too generally known to be entirely unfounded, to require a refutation here.”*

Still farther to sustain these views, not only of the nature of the disease, but of the positive efficacy of topical treatment in every stage of membranous croup, we shall proceed to adduce further testimony on these most important points.

In a recent number of the “ *Archives Générales de Médecine*,” is an interesting memoir by

* Op. Citat. pp. 200-1.

M. Vouthier, on the history of croup, as it occurred in an epidemic form in *L'Hôpital des Enfants Malades de Paris*.

In this paper are the details of several well-marked cases of membranous croup, which were treated successfully by "emetics and cauterizations;" and although in these instances the argentine solution was not conveyed into the larynx, but was applied only to the fauces and pharynx, yet the patients recovered perfectly under the treatment.* Although the cases thus treated are characterized as having been very severe—"très-intense"—yet, as the treatment was early adopted, it is probable that the exudative process had not extended to the larynx; for, in the same paper is a history given, of five other cases of membranous croup, in which the disease, having reached the larynx, was not arrested by cauterizations. This measure was employed, as in the other cases, but no attempt was made to pass the instrument below the epiglottis. Tracheotomy, however, was resorted to in all these five cases, but every patient died. Efficient cauterization of the larynx, we maintain, would have saved three, if not more of these last cases.

Among the English practitioners, of whose works, on topical medication, we have spoken, a few only appear to have employed this remedy

* Archives Générales de Médecine, tome xix. art. 1st.

in the treatment of true exudative croup. The experience of Dr. Watson, in the treatment of the few cases he has reported in his work, has led him to the conclusion, "that the topical treatment is unsuitable during the acute stage of exudative croup."

Having been unsuccessful in the management of a single case of membranous croup,* in which he employed the treatment through the acute or inflammatory stage of the disease, Dr. Watson adopts and promulgates the above opinion. In the commencement of the disease, or in that stage of the affection denominated by him "the pre-exudative stage of croup," Dr. Watson highly recommends the application of the solution of nitrate of silver to the throat and larynx. Omitting the applications during the acute stage of the disease, he renews the topical measures, as soon as the inflammatory process has been subdued by appropriate reducing measures. But his view on this subject will be best understood from the following brief extract from his work :

* The only other case mentioned by Dr. Watson, as one not benefited by the topical treatment, is that of a gentle man past the middle period of life, "who on a winter evening," was suddenly seized with difficult respiration, tightness in the throat, harsh, dry, whistling cough, and high fever, "whilst the physical signs were: Inspiration long in the trachea, and accompanied by a harsh sound of the air passing along the dry and narrowed tube." Symptoms, manifestly indicative of *acute laryngitis*, and not, as Dr. Watson supposed, of "ACUTE TRACHEAL CROUP, accompanied by exudation."—*Op. citat.* p. 51.

“There is a large class of cases, in which the croup commences by a longer or shorter stage of simple, though severe inflammation of the laryngeal membrane. This inflammation differs in nothing from the most intense degree of catarrh, formerly described ; but it speedily ends either in exudation upon the surface of the membrane, or in serous effusions beneath it.

“The suddenness of the attack, the anxiety of the patient, the severity of the constitutional fever, and, above all, the stethoscopic signs of a dry and tense glottis, never fairly released at any stage of respiration, are the chief diagnostic marks of the danger to be expected in the next stage of the disease. No one who has ever listened attentively to the peculiarly harsh sounds transmitted through the stethoscope placed over the thyroid cartilage of a patient in the critical state we are now considering, can either forget or mistake the prolonged and dry, but vibratory sound during inspiration, immediately followed by less noisy, though still grating murmur of obstructed expiration by which it is characterized. Then the stifling and painful cough, without expectoration, and the whispering, not hoarse voice, are equally characteristic.

“In children, or in adults predisposed to the disease, such a group of symptoms as that just referred to, may be considered as certainly indica-

tive of the first stage of exudative croup. But no exudation has yet been poured out, and according to my experience, the disease may here be checked by the application of an appropriately strong solution of the nitrate of silver ; and I will venture to assert, it is in the treatment of this præexudative stage of croup, if I may be allowed so to name it for sake of brevity, that Dr. Horace Green has also been successful." *

This abortive treatment of croup by topical application, is further illustrated by Dr. Watson, in his relation of the subjoined case : " It is that of a family of young children," he says, " all of whom are remarkably subject to croup, and, notwithstanding the utmost care in their management, some of them have suffered once or twice from the disease during the winter, for some years past. In the beginning of the present year, I attended two of them, and, within the last few days, a third, when attacked by the disagreeable visitant.

" Whenever a croupy cough is heard in this family, the throat and larynx are at once touched with the solution of caustic. A warm bath, a few drops of antimonial wine, and, if necessary, a dose of laxative medicine, are next had recourse to, and very little else is generally required.

* Op. citat. pp. 49, 50.

The throat is touched for the two or three succeeding days, by which time the child is usually quite well.

“ Only once that I remember did this abortive treatment fail in my hands, and it was in the case of a member of the family here referred to. The weather was at the time very severe, and the subject of the disease, a strong little boy about six years of age. For some reason or other, it was longer than usual, too, before the topical application was made to the larynx, and it failed. Exudation was thrown out, and the boy passed through a critical illness, during the intensity of which I laid aside the topical treatment, and employed leeches, calomel, and antimony. But when, as happily occurred in this case, the exudation had separated in due time, I renewed the stimulant applications to the windpipe, with marked benefit, and the child made a speedy and perfect recovery.”

In one other respect Dr. Watson differs from most practitioners in this country, namely, in the strength of the solution which he employs in the treatment of croup. He has found in practice, he says, that a solution “of fifteen or twenty grains to the ounce of water, is abundantly successful in fulfilling the indications of the disease.”

In the Academy of Medicine of Paris, a discus-

sion took place quite recently on the subject of topical medication of the air-passages in croup, in which Velpeau, Trousseau, Piorry, Depaul, and others were engaged, and this method of treatment was emphatically indorsed by that body. At a previous sitting of the Academy, M. Loiseau had presented a paper entitled, "*A simple and easy method of entering the air-passages in order to cauterize them, or to extract false membranes, to dilate the glottis, to introduce substances used in the treatment of croup, either in the form of liquid or powder, and finally to take the place of tracheotomy.*"

On this paper MM. Trousseau and Blache were appointed to report ; and their report, and the discussion that followed, may be found in the *Union Médicale* for August 27th, 1857, and also in the *Medical Monthly* for November, 1857. In this report M. Trousseau says : "It was after M. Loiseau had seen several children attacked with croup die, upon whom tracheotomy, although indicated, had not been performed, that he invented some instruments and a method of operating for entering the larynx as the pharynx is entered. His invention dates from 1840.

" Dr. Green, of New York, had already made use of a stiff curved whalebone, armed with a sponge, for entering the larynx, and the operation was facilitated by a tongue-depressor, which

is in itself an excellent instrument.
 The method of M. Loiseau is simple and infallible. He protects the metacarpal phalanx of the left index finger by a metallic ring two or three centimetres in height, and introduces it rapidly and deeply into the mouth, so that the ring may be placed between the molar teeth, and keep the jaws apart.

“With the extremity of the finger which is free, he depresses the tongue, seizes the epiglottis, raises it and presses the end of the finger between the aryteno-epiglottic folds. There is, then, nothing more easy than to make the end of the tube, which is only the tube of Chaussier, glide over the finger. The air which escapes through the exterior extremity of the tube proves that it has really entered into the larynx. Through this tube, serving as a conductor, a caustic, the nitrate of silver, for example, or any other medicated substance, may be carried in the curette of a flexible metallic shank.

“This operation of catheterism of the larynx, which is the principal point in the memoir of M. Loiseau, is considered as a very good means for taking the place of tracheotomy, and at all events to be tried before that operation.” The professor proposed, in consequence, that the thanks of the Academy be given to the author, and that his paper be sent to the committee of publication.

In the discussion that followed, M. Depaul, in alluding to the declaration of M. Trousseau that "the process of catheterism of the larynx as proposed by M. Green, was very difficult, even upon the cadaver," said he, "but I maintain that nothing is easier than this catheterism for those who have performed it a certain number of times."

"The operations [of tracheotomy] upon the larynx," said M. Piorry, "for diseases which are most frequently only secondary, are perhaps too much esteemed. In these cases the operations only shorten life, for they are useless in curing the primitive lesion. . . . The operation of M. Loiseau, which, at least, is exempt from the dangers of tracheotomy, is preferable to the last." M. Velpeau declared that to M. Loiseau "belonged the merit of having called attention to the subject." "Thanks to his memoir," he continued, "we know that croup can be cured without operating for tracheotomy. That is a great deal. . . . I believe the operation recommended by M. Loiseau is a good one. While diphtheritis is at the opening of the air-passages it is curable, and M. Loiseau has ascertained that it is not difficult to carry medications into the larynx."

The learned editor of the *Gazette Médicale de Paris*, in alluding to the discussion of the Academy, says of laryngeal cauterization: "As a therapeutical means it merits a more serious

attention. What is the relation of cauterization to croup? It is a powerful, energetic means, *the only one which up to this time has really succeeded*. When the disease is limited to the upper part of the air-passages, we cauterize, and all practitioners agree that this means is truly of great benefit. What is laryngeal cauterization other than carrying beyond the limits of ordinary cauterization a remedy, recognized as good, efficacious not only against the offence of the disease itself, but also against the pathological secretion. Laryngeal cauterization is, then, in this respect, much superior to tracheotomy. Experience seems to have already confirmed these theoretical hopes, —future experience will say much more of it.”*

In the *Gazette Hebdomadaire* for August 27, 1857, the editor after calling attention to the fact that cauterization in croup has been employed in America, adds; “The *Gazette Hebdomadaire* has translated or analyzed papers upon this subject, published in America and England; it has been careful in making the most express reserves both upon the possibility of the operation itself and its practical value; but all these reserves are an additional reason for desiring that these experiments should be repeated by us with that attention which the authority and the

* *Gazette Médicale de Paris*, August 29, 1857; also, translation in *Medical Monthly*, Nov. 1857, pp. 321, 2.

honorable position of our American *confrères* command. M. Loiseau, anticipated, as it is seen in every particular, gives us, however, a useful example, and his merit will still be great if he succeeds in introducing into common use a practice worthy of more attention than it has yet received."

In describing the instruments employed by Loiseau, in the following number of the *Gazette Hebdomadaire* (September 4), and his method of operating, the editor remarks: "M. Loiseau affirms that he penetrates with these instruments much further than the larynx, even to the bifurcation of the trachea; as Dr. H. Green also professes to do. It is seen that this is a repetition (extended and perfected) of the American processes, so much the more remarkable that it dates, in the knowledge of many persons, from a period when the labors of Dr. H. Green were not known in France, and perhaps even not commenced."* Still later, in November, 1857, the French journals contain the history of a case of diphtheritis,

* In the introduction of my work on "Diseases of the Respiratory Organs," it is stated that: "On the 26th of November, 1838, the Rev. Mr. Tilden of Vermont, who had suffered many months under follicular laryngitis, came under my care and was treated successfully by topical applications of the nitrate of silver to the pharynx and larynx. During the year 1839, I treated many cases of chronic laryngitis, by cauterizations of the larynx and trachea. These cases were reported before the "New York Medical and Surgical Society," as the records of that Society will show.

treated successfully by catheterism and cauterization of the larynx, in the practice of Prof. Trousseau. The *Medical Monthly* for Jan, 1858, contains the following case translated from the *Gazette Hebdomadaire*, of the 6th of November, the successful treatment of which is termed by the editor a "Therapeutical conquest of great importance."

"An application of the instruments of M. Loiseau has just taken place in the service of M. Trousseau, who made a very favorable report upon it at the Academy. . . . The application of the instrument was upon a little girl four years old, who entered Hôtel Dieu, October 9th, for diphtheritis, affecting exclusively the tongue, and accompanied by a slight engorgement of the sub-maxillary ganglions. The weak voice and hoarse cough, however, announced that the larynx was beginning to be affected. The cauterization of the tongue, at first with a stick of the nitrate of silver, and afterward with a solution of the sulphate of copper, insufflations of tannin, and of alum in the pharynx, the internal use of the chlorate of potass, brought about some diminution in the extent of the false membranes. The other symptoms persisted, and some fever arose. On the evening of the 23d, according to the instruction left by M. Trousseau, the chef de clinique, M. Blondeau operated for

catheterism of the larynx, after the process of M. Loiseau.

The first phalanx of the index finger of the left hand being armed with a metallic thimble, the operator opened the mouth of the child, by means of a spoon.

This was the most difficult part of the operation, on account of the resistance of the little patient.

Having, however, separated the jaws, M. Blondeau took advantage of this moment for carrying his finger quickly down the throat as far as possible, so as to reach the base of the tongue and the epiglottis. He succeeded in doing this quite easily, and the epiglottis was for an instant elevated by the finger ; unfortunately, the protecting ring was not large enough, so that he was obliged to withdraw the finger, it having been severely bitten by the patient.

Upon the second trial he was more fortunate, although the finger was not completely protected against the bites of the child. Along this finger the operator carried rapidly a metallic sound, supplied with two fenestræ, and properly curved at its extremity. In this manner he readily reached the larynx, when the finger, holding the epiglottis raised, permitted easy access. The fact that the sound had actually penetrated into the air-passages was announced by the noise which the air made in escaping through the in-

strument. Through this was immediately thrown a caustic injection (a saturated solution of the sulphate of copper), then the sound was withdrawn. The whole operation—the introduction of the finger, the catheterism, the injection—required hardly a few seconds.

A remarkable fact, and which M. Blondeau, who performed the operation for the first time, did not anticipate, was, that the operation did not appear at all painful to the child except at the moment when the finger was introduced into the mouth and the epiglottis raised. It was only then that the child struggled, and seemed agitated. As to the catheterism, and the injection itself, she bore them wonderfully well.

Another proof that the sound was really in the larynx, and even in the trachea, is that the injection of a considerable quantity of the caustic solution produced neither vomitings nor nausea; and it is well known that a very small quantity only of the sulphate of copper, taken into the stomach, is necessary for provoking not only painful desires to vomit, but excessive vomitings. Nothing of the kind, however, took place, and the patient rejected by the canula only a little viscid mucus, evidently coming from the bronchial apparatus.

The next morning, the 24th, the voice had regained in a great degree its clearness.

A second catheterism was nevertheless made, this time by Prof. Trousseau himself, who was also bitten by the child, yet succeeded in making the operation. In the evening the operation was again repeated, but this time the finger was better protected, by a slight modification in the form of the ring, the superior face of it being increased in size. The catheterism performed by M. Trousseau, was witnessed by Dr. Bouchut, who, as well as all the assistants, acknowledged not only the facility, but the harmlessness, you can say the benignity even of this operation.

On the morning of the 25th, the catheterism was performed for the last time. The condition of the patient very much improved, the voice was clearer, the lingual diphtheritis had almost entirely disappeared.

The 28th, the child was in a state of convalescence, although the voice remained a little hoarse.

Quite recently, in a number of the *Gazette Hebdomadaire*, as late as that of the 17th of Sept. 1858 is an account of several cases of membranaceous croup treated by cauterization of the larynx. One case, which is reported by M. Gros, and is represented as having been one of great severity, was that of a child five years of age ; robust, and of an excellent constitution.

The employment of emetics, and other remedies, together with cauterizations, with a solution

of nitrate of silver to the fauces and pharynx, afforded for a time some relief, by a removal of portions of the false membrane. But notwithstanding, the symptoms increased in severity, for the diphtheritic inflammation had reached the larynx and trachea, as was indicated by the intense tracheal râle, the croupal cough, and the frequent accessions of threatened suffocation. MM. Trousseau and Loiseau were called in consultation. M. Loiseau immediately practised catheterism of the larynx, introducing the sound, and injecting into the larynx and trachea a solution of nitrate of silver. "This operation," says M. Gros, "was accompanied, neither by suffocation nor by any other accident; and on withdrawing the sound it was found to be filled with thick, white false membranes." The following night was passed much more calmly than the preceding; respiration much easier and the attacks of suffocation almost entirely absent. But on the next day the fauces and pharynx presenting an appearance less favorable, M. Loiseau practised a second catheterism, followed by an injection of a solution of tannin. At 4 o'clock, on this day the patient was seen by M. Trousseau, who, although highly gratified with the improved condition of the case, still believed, inasmuch as the voice and cough were yet croupal, that notwithstanding the amelioration of the symptoms, this

condition would not continue, and that the operation of tracheotomy would be required. The improvement, however, continued, and on the day subsequent to the visit of M. Trousseau, and the one on which he proposed to operate, many portions of false membrane were expelled which presented the appearance of having come from the air-passages. As a precaution, M. Loiseau practised a third catheterism of the larynx, followed, as in the last instance, by an injection of tannin. From this moment no further medication was employed; the nourishment of the patient was gradually increased, and she soon perfectly recovered.

"This fact," says the learned editor of the *Gazette Hebdomadaire*, "has an important practical signification, and speaks loudly in favor of the advantages which may be derived from catheterism of the air-passages, and from topical applications, carried by this measure directly into the larynx and trachea." *

Now it is this plan of topical medication, denominated by the French journalists all along as "the method of M. Loiseau," and described by them as a *new* manner of treating diseases of the air-passages, that Prof. Trousseau commends as a most important measure in the treatment of

* *Gazette Hebdomadaire*, Sept. 17, 1858, p. 660.

diphtheritic inflammation, and recommends its adoption. Indeed, this eminent practitioner now discourages the employment of all the ordinary violent remedies, such as, severe vomiting, blisters, leeches, etc., and depends upon direct catheterism or cauterization of the air-passages, followed, if this measure is unsuccessful, by tracheotomy.

In an interview which I had, several years ago, with M. Trousseau, in Paris, he kindly described to me, very minutely, his method of performing this last operation in croup, and this description I shall presently give. But the reader, I trust, will pardon me, if I first ask his attention, in a brief reference, to what has been done in our own country, in the advocacy and employment of topical, therapeutical measures in the treatment of croup—measures which have recently been claimed, very generally, by the French profession as peculiarly their own; albeit, many of those French practitioners and journalists, who now advocate the practice, were but quite recently, among the number, who doubted, and even denied the possible practicability of these same measures.

It will be recollected that over ten years ago, namely in 1848, the first edition of this book was published in which the declaration was made, that "the practice of making topical applica-

tions of medicinal agents into the larynges of young children, for the treatment of membranous croup, is a plan entirely practicable, safe, and, when judiciously employed, in the highest degree efficacious."

In this work the history of eleven cases were given, in the treatment of which, cauterizations of the larynx were employed, and were relied upon as among the most efficient of the measures adopted. The date of the first case of croup, recorded as having been thus treated, is on the 20th of November, 1842 ; although cauterizations of the larynx and trachea, in the treatment of diseases of these organs in adults, had been employed as early as November, 1838. Since the publication of the work in which this mode of treatment is advocated, the author has had the opportunity of treating many cases of croup on the plan deduced from these views of its pathology, the histories of many of which have never been published, and with an amount of success that has afforded a high degree of encouragement and satisfaction.

I have also received from medical men, in different parts of the United States, as well as from numbers in Europe, the history of many cases of membranous croup, wherein topical measures, in their hands, have proved effectual in arresting the disease. To compare the Ameri-

can method with that employed by M. Loiseau, and to show that in both plans, the cauterization of the air-passages is the end aimed at, and that this end was attained in this country a long time antecedent to the French operations, I shall give, in a very brief manner, the history of a few recent cases which have been thus treated.

Having relinquished some years ago (as it is generally known to the profession), my attendance upon out-door patients, there have not fallen consequently many cases recently of this disease under my notice. A few, however, of great interest have been observed, and to these I shall refer.

CASE XIV.

On the morning of the 31st of Dec., 1855, Dr. I. O. Smith, a member of the Academy of Medicine, called at my office, and requested me to visit with him the daughter of Mr. Hachagne, of Prince street, who was very ill of membranous croup. To my invariable objection, that I visited no patients away from my office, Dr. Smith urged the severity and danger of the case, and the distress and anxiety of the parents. In short, I was taken into his carriage, and carried to the house of the patient. The child, four years of age, who had been four days sick, was exhibiting all the characteristic symptoms of true

croup, in an advanced stage, and of a very severe grade. The countenance of the patient appeared anxious, the face had lost its natural color, the voice was stifled, the respiration very difficult, and of a hissing character ; and the whole symptoms indicated imminent danger from approaching asphyxia.

The ordinary remedies having been faithfully tried by Dr. Smith, he requested that cauterization of the larynx should be immediately employed. Assisted by the doctor, I passed a small sponge-armed probang, saturated with a solution of nitrate of silver (℥ ij. to ℥ j. of water) into the larynx and trachea. After a delay of some ten or fifteen minutes, the operation was repeated, in the same manner. I am not aware that any other medical treatment was employed. The next morning, Jan. 1st, Dr. Smith called on me, and stated that the symptoms had somewhat improved during the day, and that the following night was passed with less distress than had occurred on the preceding ; but, that the child was still dangerously sick, and the operation must be repeated. I accompanied Dr. Smith, and found his patient as he had stated—certainly no worse, but still presenting a very unfavorable appearance. Cauterizations were again employed as on the preceding day. After the second application of the

caustic, the symptoms soon diminished in severity ; and during the day and night, of the 1st of January, the improvement continued. At 10 o'clock on the morning of the 2d, when we called, we found a marked and most favorable change had taken place in our patient. A single application was made on this day, and ultimately the child recovered perfectly.

CASE XV.

I was called, Dec. 18, 1853, to visit a case of croup, which had been treated nearly a week, by two homœopathic doctors of this city. I refused to go. The father of the patient then stated, that his child had been abandoned by the doctors, who considered the case quite hopeless ; but that his son was still living, and he begged I would visit him and endeavor to save his life. I stated to my assistant, Dr. Richards, that I would see the patient with him once, if he would then take charge of the case. We found the child, a little boy, four and a half years of age, struggling for breath, in the last stage of membranous croup, apparently dying of the disease. It is unnecessary to describe at length the symptoms. The difficult, stridulous respiration, the suppressed cough, the pallid countenance, and livid lips, exhibited at once the urgency of the

symptoms, and the danger of suffocation. The previous medication we could not ascertain, except that *antimony** had been freely given, and the child had been repeatedly and severely vomited. A small armed probang, the sponge saturated in strong nitrate of silver solution, was passed with some difficulty into the larynx and trachea. Some minute fragments of the false membrane were dislodged by this operation, but no marked mitigation of the symptoms followed the application; and after a delay of ten or fifteen minutes, the operation was repeated. If any relief followed the second application, it was of short duration. All the unfavorable symptoms soon returned; the struggling for breath, the dry and harsh tracheal respiration, the frequent and weak pulse, pointed, as we thought, to a speedy, fatal termination, and I left the case believing that such would soon be the result. Dr. Richards remained with the patient, and several times during the night, applied the caustic solution. Some relief followed each application, but the next day, the 19th, the case appeared so desperate that Dr. Richards, fearing the case was hopeless, after repeating the application thoroughly to the larynx and trachea, left the patient, with

* I was handed the prescription given to this patient by an eminent homœopath of this city. It consisted of a homœopathic quantity of belladonna and an allopathic quantity of tart. antimony.

directions to be sent for in a few hours if the child continued to live. He was not called for again, and nothing more was heard from the patient, who was supposed to be dead, of course, until several weeks after this, when the father came into my office, "to settle the doctor's bill for attendance upon his boy." Dr. Richards ventured to ask the father, how long the poor boy lived after he left him, when he was assured that his son was alive and in good health. That after the last application he began to improve and was soon so much better that it was not thought necessary to recall the doctor. In the course of a week he quite recovered.

In the early edition of this work, I expressed the opinion, with reference to the operation of tracheotomy, that we are not justified in having recourse to this measure, until the means now at our command, both topical and general, have been exhausted. Although subsequent experience has confirmed these views, yet, my opinion with regard to the propriety of the measure, when adopted as a last resort, has considerably changed within a few years past.

When topical measures, as ordinarily employed, have failed; when, the larynx having been relieved, the coriaceous deposit is found having extended into, and is blocking up the bronchial ramifications, and the patient appears threatened

with suffocation, then, is tracheotomy, followed by caustic injections through the artificial opening, of the highest importance. But even in such cases of severe membranous croup, where the disease has passed on to the last stage—the stage of asphyxia, in which a resort to tracheotomy has been considered as the one which can afford the only means of relief—at this stage, we still maintain, patients have been, and may be saved, by other operations than that of tracheotomy. Let me illustrate :

CASE XVI.

A few years ago, January 5th, 1850, I met a member of this Academy in the treatment of a case of croup, of much interest. It was that of a son, and I believe the only son of a clergyman (Rev. Ansel Leo) of this city—a boy of five years of age. He too had been subjected to Hahnemannian treatment several days before any efficient measures were adopted. The case threatening to prove fatal, was either abandoned by the homœopathic doctor, or he was dismissed, I cannot say which, and Dr. S—— was called to attend the case. He found the child in the advanced stage of membranous croup ; almost in the stage of collapse. Among other measures employed by the doctor, an attempt was made to vomit the child, by administering an emetic of sulphate of

copper, with a hope of dislodging the false membrane from the trachea, but the effort failed entirely ; no emetic effect was produced by this measure. I was called to visit the patient on the 5th of January, and saw the case for the first time at 11 o'clock, A.M. of that day. I found the boy lying in a state of asphyxia. The face and lips were purple, extremities cold, the surface clammy, violent efforts at inspiration were occasionally made, but the anesthesia was complete. Dr. S—— stated that he had administered while the patient could swallow a strong emetic, without producing any effect whatever. Tracheotomy had been considered as presenting the only possible chance of relief, but this chance was deemed too doubtful to warrant its adoption.

At my request, Dr. S—— took the patient on his lap, and sustained him there, with his head thrown back on the doctor's shoulder. In this insensible condition, the lower jaw fell, the tongue was readily depressed, and nearly the entire epiglottis brought into view. A small sponge probang, wet with the nitrate of silver solution, was easily passed into the larynx, through the rima, and carried down the entire length of the trachea. This was done without the child's exhibiting any opposition, or apparent consciousness. On withdrawing the instrument, which appeared to enlarge mechanically for the moment the calibre

of the air tube, the chest was expanded by a full inspiration. The sponge was again wet in the solution, and the same operation immediately repeated. This time the operation was followed by some struggling, and a cough, and considerable quantities of viscid fibrinous mucus and broken portions of membrane, were thrown up by the cough and vomiting. After a delay of ten or fifteen minutes, the probang was introduced the third time into the trachea. The child, still insensible, was then placed in bed ; and it was arranged to meet Dr. S—— in two hours again, and see the patient.

2 o'clock P.M. Found the patient at this hour still insensible, but the countenance was not as livid, the surface and extremities were warmer, and respiration was somewhat less difficult. At this visit, cauterization of the larynx and trachea was twice performed in the same manner as at the first visit ; and directions were given to administer, if possible, some stimulus and nourishment, when the child could swallow.

6 o'clock P.M. Four hours later, we met again at the bedside of our patient. As we entered the room, the little fellow raised his head, and smiling, thrust out his hand to the doctor, whom he recognized, and attempted to speak ! A great change had taken place in our patient. Soon after the applications at 2 o'clock were

made, quantities of viscid mucus and patches of fibrinous matter were ejected, after which the respiration considerably improved, and the child was able to swallow nourishment and some weak stimulus. From this hour the croupal symptoms began to disappear. No further topical applications were made, and the patient, under appropriate nourishment, recovered perfectly ; but it was three weeks before his voice was restored to a sound above that of a whisper.

Within a few weeks I have received the *Boston Medical Journal*, for January 6th, 1859, which contains a report read before the Boston Society for Medical Improvement, by Dr. H. G. Clark, of three cases of membranous croup, treated successfully by "the introduction of a solution of nitrate silver with the probang into the larynx." In the first case, a boy seven and a half years of age, "the appearances were so alarming, that at first sight tracheotomy apparently offered the only means of saving him from immediate suffocation." The probang, says Dr. Clark, was passed into and through the larynx ; it came out loaded with "false membrane." Brandy and water and beef tea *ad libitum*, and other light food, were permitted, and the patient recovered. In the second case, a little girl two years old, with "well-developed croup," in which "the treatment consisted of

the local use of the nitrate of silver, Dover's powder, steam, etc., and wine whey. The child made a good recovery."

The third case, a child two years and four months old, was very severely affected with diphtheritic inflammation. "The tonsils, and indeed the whole of the parts about the entrance of the larynx, were heavily coated with the diphtheritic effusion." The sponge probang was employed, and "a solution of the nitrate of silver was injected quite into the larynx, with the Warren syringe." But in this case tracheotomy was required ; it was performed, and the patient recovered.

When, therefore, cauterization or catheterism fail in the treatment of croup, I believe with M. Trousseau, that we should have recourse to the operation of tracheotomy. This distinguished physician, who has operated in more cases, probably, and with a greater amount of success, than any other practitioner, has been accustomed to perform tracheotomy in croup, "as soon as he can feel tolerably certain of the presence of false membranes in the larynx," and before the accession of symptoms of asphyxia.

But Prof. Trousseau now advises, as I have before stated, that topical applications should be resorted to before the employment of tracheotomy, and he announces in the *Union Médicale*,

of November, last, which I have just received, his conviction, that many lives have been saved, of those "who would infallibly have died, had not cauterization been employed." In performing this operation in those cases in which tracheotomy is indicated, Prof. Trousseau uses a double canula. The inner tube, which is a little the smallest, is made to fit perfectly to the outer one, and so fitted, that it can be removed without disturbing the external tube, *which is not to be withdrawn*, if possible, until the disease has subsided. To prevent the canula from exciting violent inflammation, from the chafing of the wound, a small piece of oiled silk, with an opening of the size of the tube, through which this instrument is passed, is interposed between the head of the tube, and the edges of the wound. The incision being made into the trachea, the edges of the wound are kept apart by the dilator, the child is raised from its recumbent posture, and when the hemorrhage ceases, the canula is immediately introduced. In order to render the air breathed by the child, as near as possible, like the naturally respired atmosphere, M. Trousseau covers the opening of the tube with a *respirator*, which is composed of several folds of gauze, and which soon becoming moist, consequently imparts vapor to the inspired atmosphere. M. Trousseau is convinced that his suc-

cess has been greater since he has adopted these improvements. As often as respiration becomes difficult, from an obstruction of the tube, the inner canula must be removed and cleansed, and this may be done without in the least disturbing the patient.

During three or four days, after the operation, M. Trousseau employs topical remedies, and these consist of dropping into the trachea, several times in the twenty-four hours, a small amount of a solution of nitrate of silver in distilled water, of the strength of about five grains to the ounce ; and, in some instances, the canula is removed, and the trachea is cleared out with a sponge dipped in the nitrate of silver solution.*

Within the last year, tracheotomy, in the treatment of croup and diphtheria, has been employed more in some parts of this country than ever before in the same period of time. During the past winter these diseases have been more

* "In 1849," says M. Trousseau, "I performed in l'Hôpital des Enfants, the operation of tracheotomy in a case of croup, which was perfectly successful. From that moment, the repugnance to the operation, which my colleagues had before entertained, vanished, and it was then established among ourselves, that thereafter, the operation should be performed in all those cases, where every other chance had failed. From that time to the present, tracheotomy has been performed in this hospital, under this rule. During this period, from 1849 up to the present time (November 2d, 1858), there have been treated 562 patients, attacked with croup ; of this number 466 were operated upon for tracheotomy, and with success in 126 cases, that is to say, 27 per cent. ; notwithstanding," says M. Trousseau, "the deplorable condition of the hospital."

than ordinarily prevalent. In some of our larger cities, particularly in Boston, Mass., many very severe cases of diphtheritic inflammation have occurred, and some almost hopeless cases have been saved through the employment of these two combined measures—tracheotomy, followed by repeated injections of a solution of the nitrate of silver, through the artificial opening, into the trachea and bronchi. I cannot better illustrate this method of treatment than by giving the details of the following highly interesting case of croup, the history of which, and its treatment, I find recorded in a late number of the *Boston Medical and Surgical Journal*. The report of the case was read before the “Boston Society for Medical Improvement,” January 10, 1859, by Dr. George H. Gay.

CASE XVII.

“Lizzie S—— æt. $4\frac{1}{2}$, under the care of Dr. Perry. During the absence of Dr. P., and while the symptoms of the disease were making rapid progress, Dr. Bowditch was sent for. He has given the following account of the case, up to 11, A.M., December 26th, 1858.

“About $10\frac{1}{2}$ P.M., December 24th, was called to Lizzie S——. Found all the symptoms of croup—noisy respiration, hoarseness, paroxysms of dyspnoea, no membrane on tonsils, fever, rest-

lessness. Disease had commenced the preceding night (23d), and was thought to be only a severe cold. Mother stated that she had often had similar attacks in the West, only this was more severe. An emetic of ipecac. and sub. mur. hydrarg. was given, a solution of nit. argent. was twice applied to the throat, and pulv. Doveri, gr. ij., p. r. n., to check restlessness ; steam in room ; cloths in cold water around the throat. No relief, except less restlessness from the Dover's powder, and partial ease after the application of nit. argent. The next day, Saturday, Dr. Perry used steam, and opium and hydrarg. cum cretâ. The disease seemed relieved during the opiate effect, but there was no real change in the character of the breathing. Saturday night there were violent paroxysms of dyspnœa, and on Sunday morning, December 26th, all the croupy symptoms and their effect had increased."

"When I saw the patient for the first time," continued Dr. Gay, "on Sunday, December 26th, 1858, 11½, A.M. the following symptoms were present : great restlessness, with constant change of position and tossing about of the arms ; head and neck thrown back ; great distress of the countenance ; lividity of both lips and a portion of both cheeks ; pallor of the rest of the face (this asphyxiate condition was permanent and not paroxysmal) ; the breathing very much labored, and

such as exists in the most advanced stages of membranous croup ; the voice merely a faint whisper ; absence of the cough, noticed since the morning ; pulse very rapid, at times 160, feeble and intermittent ; no membrane could be seen in any part of the throat. Although in an extreme condition, an operation was immediately advised.

“Operation at 12, M., with ether, and the assistance of Drs. Lewis, Perry and Bowditch.

“The neck was short and fat, and the veins very numerous and prominently distended, so much so that the dissection was carried on slowly and cautiously. But little blood was lost, and, just before the trachea was opened, the patient was, to all appearances, dead. No pulse could be felt, and there was no apparent breathing. Artificial respiration was attempted, by rolling and pressure of the chest. As no change was observed, the trachea was opened, and the same measures continued. Soon there was a jerking inspiratory act, as when a child is born, and the respiration began gradually to be established, the wound of the trachea being kept open by the dilator. Shortly afterward, she revived so much that she was able to expel, by coughing, several long strips of membrane, and much tenacious mucus, through the opening of the trachea. The pulse, 120, could now be felt distinctly, and the breathing having become more easy and quiet, the tubes

were inserted and secured. After a few minutes' rest, the solution of nit. argent. was injected through the opening of the tube into the trachea, and several strips of membrane, some of them two and a half inches long, were expelled through the tube, together with some viscid mucus. Some of the membrane was grooved, and some of it was in very small rings, evidently from a small bronchus. As soon as she was comparatively quiet and comfortable, the following *written directions* were given to the nurse : to have the air of the room constantly moist from steam ; to have the temperature between 70° and 75°, *never below* 70° ; to clean the tube at least every two hours, and oftener if it was obstructed, and if the obstruction still continued, *to remove the tubes*, and inject into the trachea some of the solution of nit. argent. ; to inject through the tube into the trachea, *every four hours*, about one-third of a teaspoonful of the solution of nit. argent. (gr. xx. to water ʒj.) ; to give a Dover's powder (gr. ij.), p. r. n., and iodid. potass., gr. ij., every two or three hours ; lace cravat to be constantly in front of the tubes. In the evening she was as well as could be expected.

“ Monday, Dec. 27th.—Had a very good night. Coughed, and expelled much membrane and mucus. To-day, her countenance is very good, and at times bright. Pulse 108, stronger than at

any time yesterday. Complains of soreness of the chest, externally. No labor, and but little noise in breathing. The swallowing of liquids produces a paroxysm of coughing. Membrane is *always* expelled after the injection of the nit. argent. Slept two hours at one time in the forenoon. Up to that time, the tube was cleared every hour, on account of the obstruction. Had a nap of two hours' duration in the afternoon. At 5, P.M., she was not so well. The cough and breathing became more dry, and labored, there was more febrile action and restlessness. Pulse 120. The solution of nit. argent. was thrown into the trachea, and in a very short time several strips of membrane, from two to three inches long, were expelled through the tube, and large quantities of mucus flowed from the mouth, enough to wet three or four handkerchiefs. She expressed herself as greatly relieved, and shortly after slept quietly for a long time. At 10, P.M., the nit. argent. was used again, with similar results. She then slept till 12½. Afterward, there was some dryness in the breathing and cough, and the nit. argent. was again used at 4, A.M. A very large quantity of membrane, in strips, was expelled. She then slept quietly till 6½, A.M.

"Tuesday, 28th, 9 A.M.—Still raises much membrane. Pulse 108. Not much thirst nor heat

of skin. Tongue looks pretty well. Some of the mucus from the tube looks yellowish. Cough more frequent, with a flapping sound. There was also a troublesome retching, which had been previously noticed in efforts to raise membrane, situated between the upper part of the tube and the epiglottis. The breathing was also obstructed and there was a more anxious look to the countenance. On removing the inner tube, cleaned two hours previous, it was found lined throughout with a thick, firm membrane. This gave but little relief to the breathing, and a flapping sound was heard, as if something fell from above, and the father had felt an obstruction in replacing the tube. The coughing being almost incessant, the other tube was removed, and the cough became sharp and ringing. As no great relief followed, the solution of nit. argent. was injected into the trachea, and after a pretty long and hard paroxysm of coughing, in which much membrane and mucus were expelled, she became suddenly easier. On taking away the lace cravat, its surface covering the opening of the trachea was found patched over with masses of thick viscid mucus and a very large piece of membrane. This membrane, from its shape and general appearance, evidently came from the epiglottis, larynx and upper part of the trachea. A portion of it, at the base of the tongue-shaped epiglottis, was

very thick, hard and firm ; below this there was nearly a solid cord, half an inch in length, with a very minute opening, just large enough to admit a small wire, and below this the membrane was tubular, softer and almost transparent, with the impression of the posterior part of the trachea where the rings are absent. This piece of membrane was between two and three inches long. Some bloody mucus was then expelled. Though much exhausted by this effort, patient took some wine whey, rallied, felt a very decided relief, and slept very quietly for two hours after the tubes were replaced. In the afternoon and evening, the breathing was very quiet, and without labor. The cough was loose, and the membrane was expelled with much less difficulty. In the evening, she sat up in bed, and took, with great relish, some milk and tea and soda cracker. Treatment as before.

“ Wednesday, 29th.—But little membrane, in strips, was raised after the large piece of yesterday morning, till early this morning. During the night, she had but little long sleep. The cough was loose and frequent, and the expectoration very viscid, with some of the membrane in granules or like boiled tapioca. There was considerable effort to force it through the tube. Early this morning the cough was looser, and several strips of membrane stained with blood,

and some yellow purulent masses of mucus, were expelled. At 9, A.M., the cough is loose and the expectoration easy. Ate a good breakfast of soda cracker, milk and tea. Felt better afterward. Pulse 108. Tongue moist and cleaning. Is sitting up in the bed, playing with her slate and pencil. Takes much notice of what is going on in the room. Countenance very bright. Respiration easy, without noise or hurry. Comfortable in the afternoon and evening. Membrane and purulent mucus expelled through the tube.

"Thursday, 30th.—Passed a remarkably good night, sleeping easily and quietly most of the time, awaking occasionally to cough. Expectored without difficulty through the tube, mostly a purulent mucus and some membrane in granules. This morning, she is amusing herself with her playthings. Pulse 100 to 108; stronger. Respiration easy, quiet, and generally vesicular. Some moist, flapping râles. Asked for her breakfast very early this morning. Appetite sufficient.

"Friday, 31st.—Took considerable nourishment yesterday. Had a good day and night; slept well. This morning, still improving. Pulse 100. Cough not so frequent; expels a thin, purulent liquid through the tube. Scarcely any membrane in strips or granules has been seen since yesterday.

'Saturday, Jan. 1st, 1859.—Very comfortable during yesterday and last night. This morning she is playing with her New Year's presents. She breathes without noise, effort or hurry. Pulse 100. No membrane expelled; nothing but a thick, purulent mucus. Appetite good. Voice hoarse and whispering.

"Sunday, 2d.—Tube removed this morning and re-inserted in the evening.

"Wednesday, 5th.—Both tubes removed.

"Tuesday, 11th.—External wound firmly cicatrized. She is daily gaining in every respect, and can speak aloud; voice hoarse.

"It would seem as if the recovery, so extraordinary in many points of view, of this patient, would be the strongest convincing proof to the profession, of the propriety and benefit of the operation and subsequent treatment, even though the patient is *in extremis*. It appeared more like raising a person, so to speak, from the dead, than in any other case of tracheotomy for membranous croup that I have as yet performed. It is a proper question to ask, what power there was to get up the membrane in so advanced a stage of asphyxia, *when the cough was extinguished*.

"The disease had not reached its height at the time of the operation, as is evidenced by the membrane approaching more and more to a solid

cord, which of course would have increased one of the main causes of the asphyxia, supposing no operation had been performed, and added a greater hopelessness to any chance of expelling the membrane.

“The mere operation of tracheotomy will ultimately avail but little, if the after treatment is slighted, or not rigorously attended to. A large tube, inserted in the trachea after tracheotomy, serves the purpose of an artificial *rima glottidis*, allowing a sufficient passage of air to and from the lungs, and, like the natural rima, it may have its opening lessened and obstructed by membrane and liquids, but unlike it in the facility with which an obstruction may be removed by withdrawing the tube. The artificial rima can be kept of a more unvarying and permanent size. Death may follow an obstruction in the artificial as in the natural rima, and as quickly.

“Through the tube, there is a more free and accessible way for the introduction of local remedial measures. After tracheotomy and the insertion of the tube, the injection of a solution of nit. argent. through the tube into the trachea and bronchi is our strongest dependence, and most of the other measures are mere auxiliaries. The strength of the solution may vary with the circumstances of the case. Three successful cases in succession, in almost as many weeks, are wit-

nesses of its usefulness. It seems to act in the following way :—*cauterization* ; a *very free mucus secretion* in the *trachea* and *bronchi* (which probably pushes off the membrane in part) ; *coughing*, and an easier expulsion of the membrane and mucus. The mucous secretion is as free in the *mouth* as if the nit. argent. had been applied there. Other substances may act as well as the nit. argent., but at present I see no reason to substitute any different agent.

“In conjunction with this, a faithful attention must be given to the steam, the temperature, the cleaning of the tube, the lace cravat, the Dover’s powder and iodide of potassa, the nourishing regimen, and stimulants if called for.

“It is well to have one person constantly by the bedside, to wipe away, with a sponge or cloth, any membrane or mucus that is expelled out of the tube, before it is drawn back again into the trachea. Another person should be present to perform any other duties that may be required.

“No membrane was voided by the mouth at any time. Some of the membrane evidently came from some small bronchus. The large piece was expelled from the opening of the trachea, about forty-six hours after the operation.

“There was no sign of pneumonia at any time.

“The tubes were removed in ten days after the

operation, and the external wound was fully cicatrized six days afterward.

“In the *seven* cases that I have performed tracheotomy for decided membranous croup, in about twelve months, and in which the membrane was expelled through the tube, there have been *five recoveries* and *two deaths*.”

In conclusion, after this brief review of what has been done in this country, and in Europe, for the treatment of true croup, are we not warranted in adopting, to a great extent, the conclusions of our own eminent and experienced countryman DR. JOHN WARE, of Boston, to which I have before referred, on the treatment of croup? “It is a disease,” says Dr. Ware, “which I would treat without depletion, except, perhaps, by a few leeches—without vomiting, without purging, without blisters, without antimonials, ipecac., and all those other nauseous remedies which have been usually resorted to. I would trust to opiates, perhaps calomel, emollients, and the *local application of the nitrate of silver*.”

CHAPTER VIII.

TREATMENT OF CROUP CONTINUED.

General Remedies.—Notwithstanding the important consideration which has been given to topical medication in these pages, I would not have its use preclude the employment of appropriate general remedies in the treatment of membranous croup. I shall only remark, however, in this connection, upon some of the most important of the many remedies which have been advised by different authors in the treatment of this disease.

Emetics.—To fulfill the first intention of cure, in the treatment of croup, which is to arrest inflammatory action, and to prevent the formation and accumulation of albuminous matter in the air-passages, emetics, more than all other general remedies, have been recommended and employed by different writers and practitioners.

“When given during the first stage of croup, they disembarass the air-passages of the glutinous secretions that clog them, and often produce such a shock to the system as to terminate the disease at once. This shock, and the

perspiration that follows it, are among the most important effects of the remedy ; for even when no mucous or albuminous matters are expelled from the lungs during the action of the emetic, the patient is generally much relieved after having vomited." *

From among the various substances employed to produce emesis in croup, the antimonial preparations are the most frequently selected. They appear to be very generally recommended by writers on this disease, both in England and in France ; and American practitioners employ this class of remedies to a great extent, in the treatment of croup. "The tartarized antimony," says the author above quoted, "is the best medicine of this kind, and it should be given at short intervals, till vomiting is effected ; after which it should not be discontinued, otherwise the reaction might prove injurious, but nauseating doses must still be administered."

Now, with regard to the use of this remedy when employed to a certain extent, and with that caution which should always be observed when administering so powerful an agent, emetic-tartar is an invaluable remedy in the treatment of exudative inflammation. But, notwithstanding all this, and the high authority for its use, I have no hesitation in declaring my firm

* Ryland, p. 153.

conviction, and this too, after many years of observation, that the injudicious use of tartarized antimony, in the treatment of diseases in young children, has destroyed more lives than it has been instrumental in saving among this class of patients!

With the young subject it not only acts as a direct and powerful sedative, but as a local irritant upon the mucous surfaces. In the observations recorded by Lepelletier on the effects of frequently repeated doses of tartar-emetic upon the human system, it is stated that the pulse was reduced from 120 to 34 beats per minute, and in one from 72 to 44 beats per minute, under the use of continued doses of tartarized antimony.*

In a recent number of the *New York Journal of Medicine*,† Prof. John B. Beck, of this city, has published a highly interesting and instructive paper, "On the effects of Emetics in the young subject." In this article he has collected the testimony of many eminent medical men, to show the uncertain, energetic, and dangerous effects of tartarized antimony, when administered in continued doses to young persons.

In one instance recorded by him, "the one-

* Medicines, their Uses and Modes of Administration, by J. Moore Nelligan, M.D., etc., p. 157.

† Vol. vii. No. 20.

thirtieth part of a grain of tartar-emetic given to a child a year old, laboring under croup, produced such severe and protracted vomiting, together with general prostration, as to require stimulants to save life." In another, "small doses of tartar-emetic," were administered to a child about three years old, in a case where no danger was apprehended from the disease. Alarming symptoms of prostration came on, and notwithstanding the use of stimulants, the child died in an hour or two after Dr. Beck saw it.

From these facts, therefore, and others which have fallen under his own observation, and from the recorded opinions of many eminent medical men, Dr. Beck has come to the conclusion, that as a general rule, emetic tartar ought never to be used in children under one year of age; and that in all cases, "the preparations of antimony ought to be resorted to with great caution in very young children, and should never be used except in those cases where a sedative effect is required, and can be borne with safety."*

As inflammatory excitement is, ordinarily, present in the commencement of croup, and the indication being to arrest this action, an emetic of tartarized antimony, either alone or in combination with ipecacuanha, may, generally, be

* Loc. cit. pp. 158-9.

administered with safety, at this stage of the disease. But, great caution should be observed in continuing the medicine, after the manner which has been recommended by many medical writers. Should a repetition of emetics be required, or medicines to be continued in nauseating doses, other remedies, equally efficacious, after the stage of excitement has passed, and altogether safer, may be employed.

If called during the first stage of croup, I am accustomed to commence the treatment of the disease, by exhibiting an emetic dose of tartarized antimony and ipecacuanha, from half of one grain, to a grain of the former, with ten to fifteen grains of the latter, according to the age of the child, and, after a delay of ten or fifteen minutes, to follow its administration with the topical application of a solution of nitrate of silver to the tonsillary and faucial regions.

This operation has the effect to excite, almost invariably, immediate and free vomiting ; and if the emesis and application be repeated in the course of half an hour or an hour, they not unfrequently arrest the further progress of the exudative inflammation.

When it becomes necessary to repeat the emetic operation, in the course of the progress of the disease, I have found the sulphate of zinc, in combination with ipecacuanha, to be the

most certain, efficacious, and safe emetic that can be administered.*

Dr. Copland recommends, as the best emetic, on the increase of the disease, tartarized antimony, and the oxymel of colchicum.

“Whilst vascular excitement continues,” he remarks, “either this combination, or the antimony only, in repeated doses, as suggested by Cheyne and Michaelis, is the best emetic; but when we wish to detach the membranaceous exudation, the preparations of squills alone, or with ipecacuanha, are preferable.” †

Blood Letting.—“If the patient is in the first, or inflammatory stage of croup,” says Dr. Cheyne, “no experienced physician will omit bleeding; if in the second, or that of suppuration, no physician will propose it.” ‡ M. Bretonneau, a physician of equal eminence and experience, makes the following observations on this subject: “I am forced to declare, contrary to the received opinion, that bleeding in croup has done harm, and accelerated rather than retarded the spread of the coriaceous inflammation.

* R Zinci Sulphatis gr. x
Ipecacuanhæ pulv. ℥j.
Aquæ tepidæ ℥iv.

Misce.—A dessert spoonful may be administered every five minutes, until vomiting occurs.

† Dictionary of Prac. Med., Article Croup.

‡ Cyclop. of Prac. Med., Article Croup.

I did not abandon this measure till after reiterated proofs of its injurious effects."

It is difficult to reconcile these adverse opinions with reference to bleeding—opinions which are not only entertained by the above authors, but likewise by many other distinguished writers and practitioners. Much the larger portion of these, however, advocate bleeding, either general or local, in croup, if resorted to in the first stage of the disease, and in case, of an unequivocally inflammatory type. "In the more inflammatory states," says Dr. Copland,* "it should be promptly and fully performed;" but he adds, "little will be gained by resorting to it before inflammatory action is manifested, or after excitement has subsided."

Mr. Ryland, who is an advocate for blood-letting when the febrile excitement is great, the patient strong and plethoric, and the disease in an incipient state, remarks: "in town practice, and especially amongst the pauper class of the community, bleeding even by leeches, generally does harm, unless in the very earliest stages of the disease; it weakens the patient, and in most instances without putting a stop to the tracheal inflammation."†

Dr. Home likewise declares that bleeding employed in the second stage of this disease, or

* Loc. citat.

† Loc. citat. p. 149.

when the membrane is formed, cannot possibly be of advantage.*

In my own experience, I have not been favorably impressed with the effects of blood-letting in croup; having met with cases where this measure being employed freely, not only failed to arrest the disease, but evidently proved positively detrimental.

I would not, however, be understood to discard altogether bleeding in croup. Cases there are, where a timely and judicious employment of this remedy will produce the happiest results. When the affection occurs in strong and plethoric children, and is attended with a high degree of vascular excitement, depletion in the access of the disease by either local or general bleeding, is a most efficient means of arresting the exudative inflammation. But if this favorable period, which Dr. Cheyne calls "the golden opportunity," be lost, and the first stage is allowed to pass, blood letting will only have the effect in the second stage to weaken the patient, and to check that muculent secretion which serves to loosen and detach the adventitious membrane, and render its expectoration more certain. Blood-letting, then, if employed at all, in the treatment of croup, let it be remembered by every practitioner, must be adopted before

* An Inquiry into the nature of Croup, p. 57.

the adventitious membrane has formed, for its use after this process has taken place, will, as M. Bretonneau has remarked, accelerate rather than retard the coriaceous inflammation.

Mercury.—Dr. Rush, of Philadelphia, was amongst the first to recommend the employment of mercurial preparations in the treatment of croup. “Our principal dependence,” Dr. Rush remarks, “must be placed on calomel; the bark is scarcely a more certain remedy for intermittents, than calomel in the humid cynanche trachealis.” *

Many other physicans place great dependence on this remedy, exhibited every few hours in croup. Some writers consider it a specific in the disease, if administered in large and frequently repeated doses. Calomel has been given alone, and in combination with the antimonial preparations, with antispasmodics, with James’s powder; with the oxide of zinc, and with opium. Of all the mercurial preparations calomel is undoubtedly the best form for internal administration in the treatment of croup. In my own experience, I have had undoubted evidence of its great utility in this disease. In all cases of exudative inflammation, where topical measures and emetics fail in the first stage to arrest the disease, prompt recourse should be

* Medical Inquiries and Observations, vol. i. p. 145.

had to mercurial remedies. Under such circumstances, I am accustomed to administer calomel in combination with opium and ipecacuanha.* The dose should be varied according to the age and condition of the patient. From one to three grains of calomel, with half a grain of ipecacuanha, and from the tenth to the twentieth of a grain of opium, may be given every two or three hours until the disease yields, or the constitution is affected by the remedy. "Directly that the patient becomes influenced by the calomel, lymph ceases to be effused in the trachea; and though it is doubtful whether the false membrane is ever absorbed again into the system, it soon becomes detached by the secretion from the subjacent mucous follicles, and will be coughed up by degrees."†

Cold Applications.—The constant application of cold water externally, is considered by Dr. Peaslee a means of the greatest value and importance in the treatment of croup. "Cold," he remarks, "must be continuously applied to produce the desired effect. Applied at intervals, indeed, it rather promotes than retards the inflammatory process; since, during the intervals,

- * B. Hydrargyri Submur. ℥j.
- Ipecacuanhæ pulv. gr. x.
- Opii pulv. gr. i.
- Misce bene et divide in pulv. x.

† Ryland, p. 148.

the temperature rises above the normal standard, in consequence of the reaction of the chill on the surface. Cold water may be constantly dropped from a sponge upon a compress laid over the throat of the child, and the latter should be of only one or two thicknesses of linen, that evaporation may go on as rapidly as possible."* The applications of hot, early in the disease, as sometimes practised, is considered objectionable by Dr. Peaslee; and that of rapid vesicants—such as aqua ammonia, etc., still more unwarrantable.

Hydrocyanic Acid.—The sedative powers of hydrocyanic acid when medicinally employed, its influence in reducing the force and frequency of the pulse, and in allaying the sensibility of the mucous system, serve to render it a valuable remedy in the treatment of some of the forms of croup.

Hydrocyanic acid was first employed as a therapeutic agent by the Italian physicians, near the commencement of the present century. Soon after its introduction into the *Materia Medica*, it obtained some celebrity as a remedy in disease of the pulmonary organs, and it has since been employed with more or less repute in other morbid conditions of the air-passages. It is the most valuable remedy we possess, for the treatment of hooping-cough. "Cautiously

* *Op. citat.* p. 200.

administered," remarks Dr. Granville, "this medicine has seldom failed to remove the disease, and it is singular that children bear the action of this sedative medicine in small doses, better than adults." *

In the treatment of the latter stage of croup, particularly when this disease has been complicated with bronchial inflammation, I have found the hydrocyanic acid invaluable in allaying the great restlessness—the spasmodic and harassing cough, symptoms which often attend this complicated form of the affection.

Various other remedies have been advised, and are employed for the treatment of croup; but, for an account of these, I shall refer the reader to the more general treatises on the disease.

* Historical and Practical Treatise on the Internal use of the Hydrocyanic Acid.

THE END.

